Transport Canada Transports Canada

TP 1624

Marine Casualty Investigations

Enquêtes sur les accidents maritimes

# Investigation Report to the Minister pursuant to sections 477 or 480 of the Canada Shipping Act (1985)

# Rapport d'investigation au Ministre conformément aux articles 477 ou 480 de la Loi sur la marine marchande du Canada (1985)

Canada

Ce rapport est aussi disponible en français.

# REPORT OF INVESTIGATION INTO THE CIRCUMSTANCES ATTENDING THE CAPSIZING OF THE CANADIAN COAST GUARD FRC NO. 244 FROM THE CCGS "SIR WILFRED GRENFELL" RESULTING IN ONE DEATH AND THREE PRESUMED DEATHS (INCLUDING THE BODY SURFER) WHILST RESPONDING TO THE RESCUE MISSION AT MIDDLE COVE NEWFOUNDLAND, OCTOBER 15, 1989.

REPORT No. 541

These sections of the Investigation Report prepared pursuant to Section 477, or of the Preliminary Inquiry Report prepared pursuant to Section 480, of the Canada Shipping Act, (1985) are released for accident prevention purposes only and are confined to cause-related circumstances.

This report and its contents may be deficient and misleading if used in any other process and are not to be used or admitted in evidence in any legal proceedings, either civil or criminal, arising out of the casualty described in the report. The statements, opinions and findings in the report are those of the Marine Casualty Investigations Division only and do not constitute admissions made by or on behalf of Her Majesty the Queen in right of Canada.

Ces sections du rapport d'investigation ou du rapport préliminaire sont rédigées en vertu des articles 477 et 480 respectifs de la Loi sur la marine marchande du Canada (1985) et ne sont publiées qu'à des fins de prévention des accidents seulement et ne portent que sur les circonstances entourant le cas à l'étude.

Ce rapport et son contenu peuvent être insuffisants et trompeurs s'ils sont utilisés à d'autres fins et ne peuvent être utilisés ou acceptés comme preuve dans quelque procédure que ce soit, au civil ou au criminel, même si ces procédures découlent de l'accident décrit dans ledit rapport. Les déclarations, les opinions et les constatations de ce rapport appartiennent uniquement à la section des Enquêtes sur les accidents maritimes et ne constituent pas une acceptation de la part ou au

Transport Canada
Transports Canada

Inspector General Transportation Safety
Inspecteur général Sécurité des transports

90-06625/

Dear Reader:

Report on the Capsizing of FRC 244,
Middle Cove, Newfoundland, October 15, 1989

On the afternoon of 15 October, 1989, a group of nine scuba divers decided to partake in a recreational body surfing activity at Middle Cove, Newfoundland. Following the entry of the nine body surfers into the water the sea conditions deteriorated and some of the surfers found themselves in difficulty. One of the body surfers was not able to reach shore and the assistance of first the Royal Newfoundland Constabulary and then the Canadian Coast Guard was requested. In the subsequent recovery operation the inshore rescue boat CG 244 was capsized by large waves and the three man Coast Guard crew was lost. An Inquiry under the Canada Shipping Act was ordered and the resulting report to the Minister of Transport has now been made public; a copy is forwarded for your information.

After review of this report, and following approval by the Minister I made a number of safety recommendations; these and the responses to them are summarized below:

RECOMMENDATION:

1) A SPECIAL CIRCULATION OF THE MARINE CASUALTY REPORT INTO THE CAPSIZING OF THE "FRC 244" BE ARRANGED FOR THE SCUBA DIVING ASSOCIATIONS SO THAT ANY LESSONS MAY BE MADE KNOWN TO THAT SECTOR OF THE POPULATION.

RESPONSE:

1) Transport Canada is making a special circulation of the report of the investigation to the scuba diving associations. This report includes a description of events in which scuba divers were involved leading up to the capsizing and loss of life.

Canada

RECOMMENDATION:

2) COAST GUARD REVIEW THE NATIONAL FRC TRAINING SYLLABUS, AND THE TRAINING AND OPERATIONAL MANUALS, TO PLACE GREATER EMPHASIS ON EXPLAINING THE DANGER OF OPERATING THESE CRAFT IN HEAVY BREAKING SURF CONDITIONS.

RESPONSE:

2) The Coast Guard has accepted the recommendation. A review will be conducted to ensure that FRC training and operating orders amply emphasize the danger of operating these craft in heavy breaking surf conditions. The review will be completed by the end of October, 1990.

RECOMMENDATION:

3) COAST GUARD REVIEW THE COMMUNICATION NEEDS NATIONALLY OF SAR OPERATIONS INVOLVING NON-COAST GUARD UNITS ASHORE AND COAST GUARD UNITS AFLOAT, TO ENSURE THAT DIRECT COMMUNICATIONS CAN BE ESTABLISHED BETWEEN PARTIES.

RESPONSE:

3) The Coast Guard has accepted the recommendation. A national review will be conducted and completed by the end of November, 1990.

RECOMMENDATION:

4) COAST GUARD REVIEW THE NATIONAL POLICY OF USING SUITS WITH SUPPLEMENTARY LIFEVEST BUOYANCY IN SAR MISSIONS WHICH EXCLUSIVELY RELY ON AIR AS A MEANS OF POSITIVE BUOYANCY. SUCH SUITS SHOULD BE INTERNATIONAL ORANGE OR YELLOW WITH REFLECTIVE TAPE.

RESPONSE:

4) The Coast Guard has accepted the recommendation. A review will be conducted to determine the optimal criteria for work suits to be worn during Coast Guard FRC operations and suitable worksuits will be developed and/or purchased. This work will be completed by September, 1991. In the interim, an order will be issued to all units which describes what may be worn.

RECOMMENDATION:

5) COAST GUARD RESOLVE THE NATIONAL POLICY ISSUE WHETHER OR NOT FRC CREWS SHOULD WEAR SAFETY HELMETS AND SAFETY BELTS OF A SUITABLE DESIGN.

RESPONSE:

5) The Coast Guard has accepted the recommendation. A national policy will be developed which requires the usage of helmets during FRC operations and which gives the FRC crew the option of using safety belts. This will be completed by the end of June, 1990.

Denis H. Pratt
Inspector General
Transportation Safety

**REPORT OF INVESTIGATION INTO THE CIRCUMSTANCES ATTENDING THE CAPSIZING OF THE CANADIAN COAST GUARD FRC NO.244 FROM THE CCGS "SIR WILFRED GRENFELL" RESULTING IN ONE DEATH AND THREE PRESUMED DEATHS (INCLUDING THE BODY SURFER) WHILST RESPONDING TO THE RESCUE MISSION AT MIDDLE COVE NEWFOUNDLAND, OCTOBER 15, 1989**

---

| | |
|---|---|
| Name | "SIR WILFRED GRENFELL" |
| Official Number | 809762 |
| Port of Registry | Ottawa, Ontario |
| Call Sign | CGJY |
| Gross Tonnage | 2,404 |
| Net Tonnage | 665 |
| Length | 63 m |
| Breadth | 15 m |
| Depth | 5.3 m |
| Draught (at time of incident) | F. 5.2 m<br>A. 5.3 m |
| Type | Steel Search & Rescue Vessel |
| Built | 1985, Marystown, Nfld. |
| Propulsion | Two 16-cylinder diesel engines, (1 & 4) SBV16M628 Two 9-cylinder diesel engines (2 & 3) SBV9M628; Deutz 12,860 BHP (total) |
| Thrusters | bow and stern thrusters, electrically driven; Ulstein; |
| Generators (4) | 2 shaft driven and 2 diesel driven; Detroit |
| Speed | 15.5 knots |
| Crew | 21 |
| Owner | Minister of Transport Ottawa |

**Particulars of Capsized Fast Rescue Craft CG244**

| | |
|---|---|
| Type | Wavebreaker 600 |
| Length overall | 6.86 m |
| Length of rigid hull | 5.68 m |
| Beam overall | 2.90 m |
| Beam rigid hull | 2 m |
| Capacity | 15 persons |
| Speed | 28 knots |
| Dry weight | 1900 kg |

**NOTE:** 1. All times in this report are expressed in Newfoundland Daylight Savings Time (UTC minus 2½ hours).

2. All references to the Canada Shipping Act in this report refer to Chapter S-9-1985 of the Revised Statutes of Canada.

3. Fast Rescue Craft (FRC) is the technical term for a type of Rigid Hull Inflatable Boat (RHIB).

**Background**

During the afternoon of October 15, 1989, a scuba divers training group of a local diving firm arrived at Torbay beach to carry out an Open Water Level Group II underwater natural navigation dive. It was determined that the water was not suitable for the exercise so a voluntary group decision was made to partake in a recreational body surfing activity at Middle Cove. The group of nine body surfers consisted of a National Association of Underwater Instructors (NAUI) qualified instructor, assistant instructor, 1 diving staff and 6 NAUI Open Water II Sport Scuba Diver students. At 1400 the nine body surfers entered the water in groups of three wearing the suitable diving apparel.

Within 20 minutes it was reported that the waves increased in height and two of the students signalled distress; one was assisted ashore. Two of the diving staff went to the assistance of the other; all three were caught in a rip tide and were carried 600-800 metres offshore. In the meantime, five other members of the group swam towards shore but Mr. Leonard Caul became separated from the other four who reached shore safely. The instructor re-entered the water to

assist Mr. Caul and established contact, but while both were swimming towards shore a large wave separated them. The instructor succeeded in reaching shore but all attempts to save Mr. Caul were in vain. Shortly after the other three body surfers, who were in the rip tide, returned safely ashore.

At 1443 the Royal Newfoundland Constabulary was alerted and, in turn, alerted the Canadian Coast Guard. The dedicated SAR vessel "SIR WILFRED GRENFELL" was tasked to the scene and prior to clearing St. John's harbour, her FRC CG237, with an approximate speed of 30 knots, was launched with the chief mate, a leading seaman and seaman aboard. CG237 arrived on the scene at 1600 and sighted the body. The "SIR WILFRED GRENFELL" arrived on the scene at 1616 and a second FRC, CG244, was lowered to provide assistance. It was manned by the second mate, senior engineer Pierre Gallien, and a leading seaman.

During the course of the recovery operation, the chief mate, Greg Peddle, accompanied by leading seaman Raymond Welcher, transferred from CG237 to CG244, exchanging positions with the second mate and the leading seaman originally in CG244.

At 1721, while the crew of CG244 was attempting to retrieve the body of Mr. Caul on the starboard side, a large wave washed over, partially flooding CG244, followed by another wave which 'pitch-poled' the craft throwing everyone into the water. Moments later the FRC was seen floating bottom up and drifting towards the cliffs, with its crew of 3 in the surf.

A second Coast Guard vessel, the "ANN HARVEY", was tasked to the scene at 1730 arriving off Torbay Point at 1845. Her Zodiac Mark IV FRC was launched at 1848, manned by the chief officer and one seaman. They recovered the body of the senior engineer, Pierre Gallien and, also, the capsized rescue craft on the east side of the entrance to Middle Cove.

The search for the remaining two Coast Guard personnel and the body surfer continued until October 21, 1989, covering a total area of 2,343 square miles and 73 miles of coastline, without success. Coast Guard Search and Rescue then placed the search on reduced status and the case was handed over to the Royal Newfoundland Constabulary as a "missing persons" case.

**Particulars of Deceased**

| | |
|---|---|
| Name | : Joseph Wilfred Pierre Gallien |
| Position on board ship | : Senior Engineer |
| Age | : 30 years |
| Address | : Caraquet, N.B. |

**Particulars of Missing Persons**

| | |
|---|---|
| Name | : Gregory Paul Peddle |
| Position on board ship | : Chief Officer |
| Age | : 34 years |
| Address | : Mount Pearl, Newfoundland |
| | |
| Name | : Raymond C. Welcher |
| Position on board ship | : Leading Seaman |
| Age | : 24 years |
| Address | : Badger's Quay, Newfoundland |
| | |
| Name | : Leonard Caul |
| Occupation | : Insulator |
| Age | : 33 years |
| Address | : Paradise, Newfoundland |

**Narrative**

On the morning of October 15, 1989, Atlantic Marine Ventures, scuba divers training, had two groups (Open Water Levels I and II) scheduled for a diving exercise in the area of Torbay beach, Newfoundland. They arrived at Torbay beach at 1240 and remained in the area until 1300, discussing the weather conditions and the feasibility of diving. Because of high wave conditions at the points of entry and exit, the dive was cancelled for Open Water Level I group. Students and the class were dismissed until the following week.

Shortly afterwards, Open Water Level II group arrived on site to carry out an underwater natural navigation dive. However, it was determined that water visibility was not suitable for the exercise. A voluntary group decision was made for the recreational activity of body surfing to take place at Middle Cove. Middle Cove beach apparently is more conducive to producing suitable waves for such activity.

At 1330, the instructor, assistant instructor and a diving staff member, all NAUI qualified, with licenced scuba divers who were Level II students, arrived at Middle Cove beach. Only the instructor, his staff and a few students had experience in body surfing, but the majority of the students were good swimmers.

Prior to commencing body surfing, the staff advised the students that such recreational activity was not part of their course and that participation was voluntary. The staff, including the instructor, also decided to join the group.

Upon entering the water, waves were described as being very high offshore and breaking on the cliffs; on the beach, the waves were one to two metres high with a considerable amount of foam on the crests. At about 1400, the group considered those conditions were reasonable for body surfing and the nine body surfers entered the water in groups of three. The majority were wearing wet diving suits, masks, gloves, fins and snorkels. Some of the staff were wearing dry diving suits.

Within approximately 20 minutes, it was reported the waves increased in height, at which time one student signalled distress and was assisted ashore by the instructor. Another student was also in need of assistance and two of the diving staff swam to him, however, the three men were caught in the rip tide and carried some 600-800 metres offshore. During that time, the five other body surfers, including the instructor, swam towards the shore. Unfortunately Mr. Caul was separated from the four who reached shore safely. The instructor had to re-enter the water to assist him. As they established contact with each other, both swam towards the shore but within 45 metres of the beach, a large wave separated them. The instructor surfed on the large wave and landed on the beach, leaving a total of four persons drifting in the cove. Several unsuccessful attempts were made by the instructor to re-enter the water to assist Mr. Caul but all efforts were in vain due to the high waves. In the meantime some of the students went to a private home and telephoned the Royal Newfoundland Constabulary (RNC) at 1443 requesting their assistance. The RNC dispatched a police vehicle immediately to the scene.

At 1445 the RNC alerted St. John's Coast Guard Traffic Centre that 3 or 4 "wind surfers" were in distress off Middle Cove beach. This information was relayed to the Marine Rescue SubCentre (MRSC) Duty Marine Controller at St. John's. The MRSC Duty Marine Controller contacted the RNC at 1451 to obtain more information about the situation. The CCGS "SIR WILFRED GRENFELL", at her berth in St John's harbour, was then tasked to the scene.

A general marine broadcast was issued via St. John's Coast Guard Radio requesting vessels in the immediate area to report their positions to MRSC St. John's. At 1455 the RNC advised MRSC that the individuals who were in distress had returned safely ashore except for one person who appeared

unconscious or dead, floating face down. At 1509 RCC Halifax was advised by MRSC that a helicopter may be required if the FRC was unable to recover the swimmer. The "SIR WILFRED GRENFELL" let her lines go at 1513 and prior to clearing the harbour, the FRC CG237 was launched with the chief mate, Greg Peddle, leading seamen Ray Welcher and another seaman, aboard. The full speed of the CG237 is approximately 30 knots.

At 1526 the MRSC Duty Marine Controller spoke with the RNC and it was confirmed that there was only one person in the water floating face down and this information was relayed to the "SIR WILFRED GRENFELL". At 1606 the RNC reaffirmed the previous message again including the information that the person had been in the water, face down and not moving, for over 1½ hours. The same message was passed to the "SIR WILFRED GRENFELL". FRC CG237 was on scene at 1600 and sighted the body awash at the base of the cliff and reported "horrendous, absolutely huge" swell in the cove hindering any attempt to recover the body. The "SIR WILFRED GRENFELL" arrived on scene at 1616. To provide support to CG237, a second FRC but of different design with an inboard engine, CG244, aboard the "SIR WILFRED GRENFELL" was lowered at 1617, manned by the second mate, senior engineer Pierre Gallien, and a leading seaman. CG244 was considered a very highly manoeuvrable craft because it was equipped with a jet drive inboard diesel engine.

While the crew of CG237 was assessing the situation at Middle Cove at the request of MRSC St. John's, they advised the master of the "SIR WILFRED GRENFELL" that a helicopter would not be effective at the time due to the close proximity of the body to the cliff and the severe sea state. The master in turn relayed the information to MRSC.

The St. John's Fire Department was notified at 1525 and responded with a rescue unit including an aerial ladder vehicle and van. They arrived at 1532 and were directed by the RNC to an area suitable for access to the site on a promontory, below which the body could be seen, where the Fire Department's rescue teams could be lowered down the cliff.

At about 1611, to assist the crew of the FRC in the rescue operation, the diving instructor swam to CG237. While in the middle of the bay, the chief mate Greg Peddle, accompanied by leading seaman Raymond Welcher, and the diver, transferred from CG237 to CG244, exchanging positions with the second mate and the leading seaman originally in CG244. The chief mate took command of CG244 assisted by the senior engineer Pierre Gallien and leading seaman R. Welcher. The

chief mate and the leading seaman were wearing Fitzwright SAR suits and the senior engineer was wearing a Mustang Floater suit. The second mate, assisted by two seamen, took command of CG237, which was having some problems with the starboard outboard motor.

In an attempt to recover the body, assisted by the diver, a towline was secured between the two fast rescue craft, leaving CG237 to seaward and backing in towards the shoreline with CG244. It was the intention to attach a safety line to the diver while he swam towards the body. The rescue attempt was cancelled because there was some difficulty with the towing arrangement and worsening sea conditions. The towing line was disconnected and a safety line was put around the diver while he swam safely ashore. In the meantime the RNC, using the voluntary assistance of the surfing group, made several unsuccessful attempts to recover the body. During that time the master of the "SIR WILFRED GRENFELL" repeatedly advised the crew of the FRCs not to take unnecessary risks and specifically not to enter the surf.

The body was sighted again by the crew of CG244 at 1714, in the southeast corner of the cove, but due to the close proximity of a large rock and heavy surf which on striking the cliff rose 10 to 13 m (30 to 40 feet) vertically up the cliff, they were unable to attempt recovery. However, they stood by, observing the fire department rescue team attempting to descend the cliff as the body appeared below them; however, sea conditions were extremely high and with this and other factors, it was decided to terminate the firemen's efforts. There was no direct communication between the FRCs and the shore party except via the ship, through MRSC to the RNC.

Shortly thereafter, the body appeared to be floating in more accessible water due to a lull in the waves and CG244 was manoeuvred to attempt the recovery. At 1721, while the crew of CG244 was attempting to retrieve the body on the starboard side and while close to a shoal, a course alteration to port was made to avoid an approaching large wave, bringing the craft to a position with the wave astern in order to run before it. The rescue craft was overtaken by the wave which broke into the forward section and, with a 'bow-down' attitude the boat'pitch-poled', throwing all hands into the water and was seen moments later floating bottom up and drifting towards the rocks.

One of the FRC crew swam to the stern of the craft, apparently attempting to activate the self-righting device. Shortly afterwards the senior engineer, who was wearing an orange floater suit, was seen clinging to a nearby rock, then

being washed away. In the meantime, the diving instructor, assisted by the RNC and members of the surfing group, secured a line to himself, entered the water and reached the senior engineer. Unfortunately, they were struck by a wave and were separated.

At 1730 MRSC, St. John's, requested a helicopter from RCC Halifax and tasked the CCGS "ANN HARVEY" to the scene from her berth in St. John's harbour. She arrived in a position off Torbay Point at 1845. Several data marker buoys were deployed to estimate the direction and speed of the current. At 1848 her Zodiac Mark IV rigid hull type FRC was launched manned by the chief officer and one seaman, each wearing a standard immersion suit. They recovered the body of the senior engineer, Pierre Gallien, on the east side of the entrance to Middle Cove and brought it aboard the "ANN HARVEY".

At 1945 they recovered the damaged CG244 in the same general area but encountered some difficulty in securing a towline to the capsized craft. As they came alongside the "ANN HARVEY", the single inboard diesel engine stalled because of the continuous wash of seawater over her deck during the tow, but they were successful in securing a line to the ship and both boats were retrieved safely from the water.

During darkness, the reflector tape on the floater suit and on the capsized CG244 was an important factor in detecting the body and the boat, with the aid of searchlights, in the large swell and restricted visibility.

FRC CG237 had returned to the "SIR WILFRED GRENFELL" at 1802 for refuelling and to inspect the starboard outboard motor. Subsequently she was lowered into the water at 2001 and resumed the search.

The crews of CG241 and CG242 FRC (Zodiac Mark V) were shore-based in St. John's Harbour and utilized for SAR training of other Coast Guard personnel. They were alerted by MRSC and at 1930 four persons left aboard CG241, bound initially for the "SIR WILFRED GRENFELL", to disembark a marine SAR controller to assist the master during the search activities. The marine SAR controller holds a Coast Guard Command Certificate and had previously served as chief mate aboard the "SIR WILFRED GRENFELL". After dis-embarkation of the marine SAR controller, CG241, manned by three persons, joined the search in the area of Middle Cove.

FRC CG242 left St. John's at 2117 and joined the search activities.

During the night a Universal helicopter, a Coast Guard helicopter, a SAR helicopter and a SAR Buffalo aircraft carried out an extensive search of the area with negative results.

For seven days, an intensive coordinated search for the three missing men was carried out utilizing the following resources:

- CCGS "SIR WILFRED GRENFELL"
- CCGS "ANN HARVEY"
- CCGS "SIR JOHN FRANKLIN"
- Four Coast Guard Fast Rescue Craft
- DFO "SHAMOOK"
- PB "STANDOFF"
- three Coast Guard helicopters
- two SAR Labrador helicopters
- a Buffalo aircraft
- Coast Guard Emergency
- Royal Canadian Mounted Police and Naval Diving Teams
- members of the Royal Newfoundland Constabulary

The search covered a total area of 2,343 square miles and 73 miles of coastline for a total search time of 629.5 unit hours. A team of naval divers completed an underwater search of Middle Cove, Outer Cove and associated shorelines, including various coves, from October 20 until October 25, revealing several pieces of debris only.

As of 1900 October 21, 1989, RCC Halifax placed the search on reduced status and the case was handed over to the Royal Newfoundland Constabulary as a 'missing persons case'.

## Analysis

### 1. Body Surfers including the Victim

Atlantic Marine Ventures is a commercial enterprise, one facet of which is to provide fee-paying scuba instruction based on a national standard.

The group of body surfers consisted of a NAUI qualified instructor, assistant instructor, one diving staff and 6 NAUI Open Water II Sport Scuba Diver students.

The new Open Water II (previously called Level III Sport Scuba Diver) is considered a mid-level, continuing

education certification course for divers who have successfully completed a NAUI Open Water I (previously called Level II), or have equivalent training or experience. The course is taught wholly in an open water setting and based on the National Association of Underwater Instructors (NAUI) education standard. The new system combined Level I - Basic Scuba Diver and Level II - Open Water, calling it Open Water I. The six students had successfully completed that level and of the six open water separate dives required for Open Water II, they had completed four.

The following are some of the skills taught at Open Water II:

A. Prepare and present dive plan
B. Use of specialized equipment
C. Assume a leadership role
D. Rescue and assists
E. One night dive
F. 5 additional dives under varying conditions ... and much more

This course enables a student to receive the NAUI Diver certification card. He/she is then considered to be competent to plan dives and accomplish underwater tasks that he/she has learned.

The surfing exercise was not scuba diving related, and purely 'pleasure', thus did not come under any code of conduct and the decision to body surf was a voluntary decision by each individual, including the instructor and his staff. Although not part of the official syllabus, body surfing skills are a useful addition to the competence of a scuba diver.

Body surfing is not considered a popular sport in Newfoundland because of the danger associated with the rugged coastline and harsh environmental weather conditions.

Mr. Caul was reported to be a very strong swimmer, in good physical condition, and was known to swim 4 to 5 times a week in a public swimming pool. He used the snorkel swimming method prior to and after joining the scuba diving course.

2. <u>Inspection and Certificates</u>

The "SIR WILFRED GRENFELL" had a valid Steamship Inspection Certificate issued by the Ship Safety Branch

of the Canadian Coast Guard on December 1, 1988, which was due to expire on December 1, 1989. The vessel's complement on the day of the incident was 21, including the master, and she was carrying the appropriate life-saving equipment for a vessel of her class in accordance with the Life Saving Equipment Regulations made pursuant to the Canada Shipping Act. The two FRCs aboard her do not form part of her life-saving equipment. Being a primary SAR vessel, the FRCs form part of her SAR equipment to meet search and rescue operational requirements.

3. Reporting of Occurrence

1445 - the Royal Newfoundland Constabulary (RNC) reported 3 or 4 "Wind surfers" drifting in Middle Cove and requested Coast Guard assistance.

1455 - the RNC confirmed one diver floating face down in water, probably dead, and his companions all ashore.

1457 - MRSC notified the "SIR WILFRED GRENFELL" of one dead person floating and maybe two or three besides him.

1502 - MRSC notified Acting Regional Manager of Search and Rescue of 3 or 4 surfers and divers, including one floating face down.

1504 - the RNC at the scene believed a boat would not be suitable for the rescue because of the location of the body near the rocks and the severe sea conditions and questioned if MRSC could notify any agency who may have a helicopter available. In reply, MRSC informed that there was an FRC on the way which could manoeuvre around the rocks without difficulty adding that if the crew of the FRC felt there was a requirement for an aircraft they would advise MRSC and it would be made available.

1509 - MRSC notified RCC, one dead body floating face down and a couple of persons still out, cannot get back.

The MRSC Duty Marine Controller misunderstood the RNC confirmation of one person, only, drifting in Middle Cove and kept on reporting to all agencies that there was more than one person in distress. The situation was rectified at 1526 and all agencies, including the "SIR

WILFRED GRENFELL" and the FRC were advised of only one person drifting.

The degree of urgency to respond to the distress was, from the outset, considered very high and prior to the "SIR WILFRED GRENFELL" clearing St. John's harbour, her FRC CG237 was sent ahead. The speed of CG237 is over 30 knots which is about twice the speed of the "SIR WILFRED GRENFELL". The distance from St. John's to Middle Cove is approximately 9 miles.

The crew transfer from CG237 to CG244 was made because of problems with the starboard engine of CG237 and because CG244, with its diesel jet drive, was considered more suitable for the task at hand.

The problem with the starboard engine of CG237 was caused by occasional inadvertent application of the choke.

4. Civil and Humanitarian Assistance

The National Search and Rescue manual states that the Department of National Defence and Canadian Coast Guard Search and Rescue resources may be tasked for civil and humanitarian disaster assistance if they receive a request from Federal, Provincial, Territorial health or emergency planning authorities.

In a body recovery situation as was the case at Middle Cove beach, and in compliance with above-mentioned procedures, Search and Rescue (SAR) resources were made available to assist the Royal Newfoundland Constabulary as required.

5. Degrees of Marine Urgency

There are three degrees of urgency as follows:

a. - "UNCERTAINTY" phase exists when there is doubt.

b. - "ALERT" phase exists when there is apprehension.

c. - "DISTRESS" exists when positive information is received that a person, ship or craft is in grave danger.

The case of the body surfers drifting offshore in Middle Cove was considered distress of the highest degree of urgency and action had to be taken quickly and positively. The MRSC Duty Marine Controller's

classification of the SAR incident as one of distress was appropriate.

6. SAR Jurisdiction

A SAR incident is defined as a reported incident which requires a response by the SAR system. Abbreviations used in the following paragraphs are; SM (Search Master), CF (Canadian Forces) and SOPs (Standard of Operations).

"Terms of Reference, "The National Search and Rescue Manual", Chapter 3, Paragraph 19 states in part:

> Generally, marine SAR incidents occurring within a MRSC responsibility sector will remain under control the MRSC except in the following circumstances:
>
> a. the incident is of a nature that formal designation of a SM is deemed necessary; and
>
> b. CF aircraft are required.

**NOTE** - Under circumstances described in the RCC SOPs, control of SAR aircraft may be delegated to MRSCs, however, initial tasking of aircraft for SAR shall be carried out by RCCs.

"Policy and Operational Directives, The National Search and Rescue Manual", Chapter 4, Paragraph 42, states in part:

> In incidents where the search object is a diver or swimmer, the vehicle or platform from which the diver entered the water should be recorded but is not to determine the incident classification. All such cases are to be classified as aid to the civil authority. Provincial and/or local authorities are to be advised by the RCC/MRSC of a diving incident, and the RCC/MRSC will assist when requested. If for any reason the proper civil authorities cannot be advised, the RCC/MRSC controller is to take appropriate action as detailed in Chapter 5, Paragraph 50 to 58 until civil control is assumed.

Chapter 5 'SAR Operational Procedures' Paragraph 50. 'Rescue Actions - Diving Accidents', states:

> Diving accidents are normally the responsibility of local civil authorities. It may be necessary, however, for a controller to ensure that appropriate action is taken until the responsible authority can take charge of the incident.

The incident was reported by the body surfers to the RNC and while the police were investigating the matter, the RNC Communications Centre contacted St. John's VTS, Canadian Coast Guard, seeking assistance. The body surfers entered the water from the beach, and it was thus the opinion of the RNC that the incident was under their jurisdiction.

Upon receipt of the request for assistance from the RNC, MRSC assigned appropriate marine resources and classified the incident as Humanitarian. (See Analysis 4).

The marine SAR manual makes no specific mention of a policy on the recovery of bodies. However this is not considered significant; for humanitarian reasons bodies are always recovered when possible and the decision to do so rests with those on scene.

7. <u>Helicopter deployment</u>

The RNC questioned MRSC on the availability of a helicopter from any source.

The decision by the MRSC Duty Marine Controller to deploy certain types of SAR resources in adverse conditions is a judgemental call. Generally, the controller's background, qualifications and past experience would have some effect on his decision.

The MRSC Duty Marine Controller that day initially made his recommendation not to send a helicopter after consultation with the SAR resources on scene which reported "horrendous" swell conditions and after taking into consideration the length of time that it would take for the helicopter to arrive.

The National SAR manual, SAR Operational Procedures, Chapter 5, para 54 states:

The choice between helicopter and surface vessel depends on various factors such as:

a) - Helicopter capability;
b) - Weather conditions and sea state;
c) - Distance to be covered; and
d) - Condition of the casualty.

Initially the RNC, after evaluating the on scene situation and taking into consideration that the body was located on the south-east side of the cove near the rocks in heavy surf, felt that a boat would not be suitable for its recovery. Consequently the RNC at 1505, questioned MRSC St. John's if any agency had a helicopter available.

At 1509, MRSC advised RCC Halifax that a request for a helicopter would be made if the FRC tasked were unable to recover the body. At 1515, the RCC marine controller was informed that SAR air resources were available if required. The crew of FRC CG237, who were familiar with SAR operations, arrived on-scene at 1600. The on-site assessment made by them, at the request of MRSC St. John's, was that a helicopter would not be effective. This advice was relayed by the "SIR WILFRED GRENFELL" to MRSC, who in turn advised RCC at 1611.

Following the capsize of FRC CG244, when the crew were thrown into the water, the incident changed from a humanitarian to a marine SAR incident and was so classified. In accordance with SAR procedures, a request for helicopters was immediately made by MRSC St. John's to RCC Halifax.

**Helicopter availability:** Coast Guard and commercial helicopters, while available at St. John's, are not equipped to recover people or objects from the water. Coast Guard is currently examining the fitting of a recovery system to some helicopters and the provision of appropriate training to their crews.

The nearest helicopter available with SAR capability, including the capability of recovering and hoisting an unconscious person from the water, was at Gander, Newfoundland; but this helicopter would have taken about 2 hours to arrive on scene.

When a SAR helicopter is dispatched to the scene of an emergency, upon arrival, the pilot and his rescue team will determine the course of action to be followed taking into consideration the on scene conditions.

8. Cold Water Survival

A Canadian Red Cross Society pamphlet entitled 'Cold Water Survival' graphically illustrates the predicted survival time for average adults, holding still in ocean water, wearing a standard lifejacket and light clothing, is about 2½ to 3 hours in water of 10°C (See Annex I). On October 15, 1989, the seawater temperature reported in the area of Middle Cove was about 9°C.

The major contributing cause of death for persons immersed in the frigid water off Newfoundland and Labrador is hypothermia (loss of body heat). In cold water, the skin and peripheral tissues cool very quickly, however, it takes 10-15 minutes before the temperature of the heart, brain and other internal organs begins to drop. Once cooling begins, the body temperature falls steadily and unconsciousness can occur when the core temperature drops from the normal 37°C. Cardiac arrest is the usual cause of death when the core temperature cools to below 30°C (see annex II).

Since the body surfer and the three occupants of the FRC were wearing different types of protective garments which, most likely, would have prolonged their survival time from two to ten times that of persons wearing life preservers alone, it is the opinion of a medical expert witness, who was on the scene, that hypothermia was not considered the main contributory factor in the deaths. Physical injury leading to drowning was probably the cause of death. Some of their injuries may have occurred during the capsizing of the FRC and subsequently by being crushed against the rocks by the heavy force of the waves.

At about 1500, while the body of the body surfer, Mr. Caul, was floating in the southeast corner of Middle Cove, the medical expert witness on scene watched him for some 5 minutes washing in and out close to a large rock and striking various rocks near the cliff. He appeared unconscious, his airway was underwater most of the time and the snorkel was waving about which indicated that it was held only by its strap, not firmly in the mouth. It was concluded from these observations that the body surfer was unable to breathe and could be presumed dead. This opinion was relayed to the RNC, who

in turn informed MRSC St. John's. Several other witnesses, including the police, came to the same conclusion.

## 9. Cause of Death

An autopsy was carried out on the late Mr. Gallien and it was determined that the immediate cause of death was asphyxia due to immersion in salt water, seconded by multiple head lacerations. The Forensic Laboratory report indicated that tests for drugs and alcohol were negative.

Shortly after the capsizing of the FRC, the senior engineer, wearing an easily distinguishable orange colored floater suit, was observed by several witnesses on scene to be landing on a large rock. He attempted to climb the rock until the next run of heavy seas washed over it, crushed him momentarily against it, then washed him away. He was seen floating on his back and his right hand moving in a convulsion which would be consistent with a head injury or hypoxia from near drowning. Shortly afterwards he appeared motionless.

The autopsy report concludes:

> Other significant findings at autopsy included several lacerations to the scalp, some of which were deep to the calvarium, associated with prominent haemorrhage into the soft tissue and also evidence of rupture of the right sternocleidomastoid muscle. In view of the degree of haemorrhage into the soft tissues, it is probable that these injuries were sustained ante-mortem and may have contributed to death by incapacitating the deceased.

## 10. Lifejackets and Exposure Protection Garments

The Small Vessel Regulations require that one approved standard lifejacket or approved small vessel lifejacket be carried for each person on board. The crews of FRCs CG237 and CG244 did not wear approved lifejackets which have the capability of turning an unconscious body face upward, because they are considered cumbersome and, thus, dangerous while working in a small craft. It should be noted that approved standard lifejackets were on board "SIR WILFRED GRENFELL" for each member of the crew.

The following different types of exposure suits were worn by the crews of the FRCs and the body surfer on the day of the tragedy:

a. - wet diving suit, colour dark and light blue;
b. - Mustang floater suit, colour international orange;
c. - Helly Hansen survival suit, colour orange;
d. - FitzWright SAR suit, colour red.

It is the opinion of a medical expert that the above-mentioned suits provide good thermal protection against the loss of body heat and prolong the survival time in the range from 2 to 6 hours in an average water temperature of +9°C., providing the suits remain intact and the subjects were wearing some type of thermal underwear.

A study comparing heat loss rates of different types of exposure protection in calm water with a temperature of 11.8°C., found the average cooling rate for subjects wearing a life preserver in addition to basic clothing ensemble was 2.3°c/hr. Subjects wearing uninsulated exposure suits averaged 1.07°c/hr. (Loss rate less than twice that of the subject with only life preserver). Subjects wearing insulated exposure suits averaged a loss of 0.31°c/hr. (Improvement of seven times over a subject with life preserver only). Applying the same water temperature (11.8°C.) the study estimated the time to incipient death for those in life preservers as 3.4 hours, uninsulated immersion suits 7.0 hours and for insulated exposure suits 23.1 hours.

It can be concluded from the study that immersion suits or insulated exposure suits would be a great asset in increasing the survival time for persons immersed in cold water.

In spite of the extensive search of the area, only one of the victims' bodies was recovered. His suit was approved as a Personal Flotation Device by the Department of Transport under regulations made pursuant to the Canada Shipping Act. The material of the suit had inherent positive buoyancy as well as thermal protection. The body remained afloat despite substantial exterior damage to the back of the floater suit. The reflecting material and the international orange colour of the suit were of great assistance in locating the body during darkness.

The wet diving suit worn by the body surfer was made of neoprene which had inherent positive buoyancy and was observed throughout the afternoon to provide good flotation although face down. The colour of the wet suit was light and dark blue without reflective material and during the hours of darkness the body may have escaped detection in the subsequent search.

The other two Coast Guard victims were wearing SAR suits and the Boaters Inflatable Life Vest, which are based on the design of a diver's dry suit. These suits were specifically adapted to meet the needs of Coast Guard personnel in the Newfoundland Region for use aboard Fast Rescue Craft. The SAR suit is not an approved product and there is no standard set for such a suit. However, the suits are based on FitzWright 'commander' and 'aviator' helicopter suits which are widely used by various institutions and government agencies and are DOT approved under regulations made pursuant to the Aeronautics Act. It is designed as a working suit and constructed of 420 denier nylon, coated with a polyurethane coating. The flotation is provided by the entrapped air within the suit and additionally, if inflated, by a 'Boaters Life Vest'.

The inflatable vest, which is based on the approved 'Air Crew' vest standards, has a CO2 bottle and can only be activated manually by pulling a cord. The Personal Life-Saving Appliances, Regulation 32 - Lifejackets, of the International Convention for the Safety of Life at Sea, (SOLAS) contains the following information on inflatable lifejackets:

> A lifejacket which depends on inflation for buoyancy shall have not less than two separate compartments and comply with the requirements of the General Requirements for Lifejackets and shall inflate automatically on immersion, be provided with a device to permit inflation by a single manual motion and be capable of being inflated by mouth.

It should be noted that the SAR suits and the boaters' vests worn by the crew of FRC CG244 were not, nor were they intended to be, a part of the vessel's life-saving equipment as required by SOLAS. These items were worn as thermal protective clothing with a flotation capability to protect the crew against exposure.

Neither the SAR suit nor the life vest had inherent buoyancy, meaning that if the material is punctured, the

buoyancy, as well as some of the thermal protection, would be lost. The main problem with this type of suit is the conflict between buoyancy and thermal protection on the one hand and comfort and mobility on the other.

In view of the damage known to have occurred to Mr. Gallien's floater suit, similar damage could have been expected to have been caused to the suits of the other two crewmembers.

On the day of the occurrence, the "SIR WILFRED GRENFELL" had 8 FitzWright dry suits and 3 Helly Hansen dry suits; thermal underwear was provided for each suit. Additionally, each crew member had a Mustang floater suit as a personal issue.

Strobe lights, Model Mayday II app.No.80-11, were stored in the same area as the suits. The lights can be activated manually or by immersing in water. There is a special pocket provided in dry suits for the strobe lights, however, it cannot be determined whether or not they were fitted in the victims' suits that day.

The Standard for Marine Abandonment Immersion Suit System (Dry) TP8820(E) October 1987, published by the Ship Safety Branch of the Coast Guard, Section 6.1.8. states - the primary colour of the exterior surface of the suit system shall be an International ORANGE/YELLOW or an equivalent high visibility colour acceptable to the Approval Authority.

As SAR suits are not Marine Abandonment Immersion Suits, these standards do not apply. However, all SAR clothing, in the interest of safety, should be of a high visibility colour.

The first order of the SAR suits in the Newfoundland Region were of orange colour and the remainder were red.

**Protective Helmets:** No protective helmets were supplied or worn by the crew of the FRCs. The Newfoundland Region did some testing of radio-equipped helmets but found them unsuitable because they restricted necessary background sound. Hockey helmets were considered but found unsatisfactory as they cannot be worn with various types of liners.

The United States Coast Guard Rescue and Survival Systems Manual states in part that:

> Crew members on boats wear helmets under hazardous conditions, such as heavy

> weather and helicopter operations. Coxswains shall ensure all crew members wear helmets during hazardous conditions.

The Manual also states in part that a motorcycle-type helmet is best for crews and that the helmets should not obstruct the wearers vision or hearing.

Reportedly Royal National Lifeboat Institution crews in the United Kingdom are equipped with helmets which incorporate a radio communication capability.

While the wearing of helmets would have afforded head protection to the victims it is not possible to determine if they would have affected the outcome of this casualty.

## 11. Weather Conditions

Forecast: The Marine Synopsis for Newfoundland issued by Environment Canada on Sunday, October 15, 1989 made reference to a low pressure system south of Greenland originating a strong to gale force northwest wind over northeastern waters and a moderate to strong wind over the rest of the district. The forecast at 1000, October 15, 1989 for the east coast had ended the forecasted gale warning and advertised a northwest wind 20-30 knots, diminishing to westerly 15 the following day.

The forecast for St. John's that day at 1100 read as follows:

> Today mainly cloudy, scattered showers developing with moderate westerly wind and a high temperature near 8°C. Tonight, mainly cloudy, isolated showers with light to moderate westerly wind and a low temperature near one.

The hourly weather observation recorded at St. John's weather office for October 15, 1989 showed light N'ly wind, speed ranged from 02 to 17 knots, good visibility, a steady rise in sea level atmospheric pressure and a high air temperature of 7.6°C and a low of 2.0°C.

High tide was at 0830 and 2105, each with a height of 1.4 m. Low tide was at 1500 at a height of 0.2 m.

Meteorological conditions, such as strong or prolonged winds, abrupt changes in atmospheric pressure, or prolonged periods of very high or low pressures,

introduce fluctuations in the water level.

No evidence of sudden fluctuation of meteorological conditions was found except a gradual increase in the wave energy and height. Their interaction with the ebb tide may have affected the height of the waves in the cove.

The Waverider Buoy located off St. John's recorded the following on October 15, 1989:

| Time | Significant Wave Height | Peak Period |
|---|---|---|
| 1220 | 3.7 m | 16.7 sec. |
| 1320 | 4.4 m | 16.7 sec. |
| 1350 | 4.5 m | 18.2 sec. |
| (Divers entered water at 1400) | | |
| 1410 | 4.2 m | 16.4 sec. |
| 1450 | 4.7 m | 16.7 sec. |
| (Low water at 1500) | | |
| 1550 | 4.6 m | 18.2 sec. |
| 1620 | 4.8 m | 16.7 sec. |
| 1650 | 5.3 m | 16.7 sec. |
| 1720 | 5.5 m | 16.7 sec. |
| (Casualty occurred at 1721) | | |
| 1750 | 5.4 m | 18.2 sec. |
| 1820 | 5.1 m | 18.2 sec. |
| 1850 | 5.2 m | 16.7 sec. |
| 1920 | 6.2 m | 16.4 sec. |
| 1950 | 5.5 m | 16.7 sec. |
| 2020 | 4.9 m | 18.2 sec. |
| 2050 | 5.7 m | 15.4 sec. |
| (High water at 2105) | | |

**Swell Wave**

**Significant wave** means the average height of the highest one third of the waves in the swell train.

**Period** means average zero-crossing period of the waves in the swell train. From the above observations and the records it can be confirmed that there had been a gradual increase in the wave height and energy since the early morning hours.

**Swell** is long waves formed by winds blowing over a distant area of ocean that travel rapidly over the surface. These long waves, or rollers, contain much energy and normally take several days to subside. They are seen as breakers on the shoreline. The northerly

sea swell encountered on the day of the incident and several days thereafter, off the east coast of Newfoundland was generated by a deep low pressure system located off Greenland. When the depth of the ocean bottom is half the wavelength of a certain part of a wave, that part begins to "feel bottom" similar to the area of Middle Cove. This would change the length, speed, direction and energy of the wave. The energy between the crests remains the same and combined with the crest moving closer, the waves become higher and steeper, until they are as high above the water as the water depth. When this occurs, the waves tumble into breakers or surf and with the change in the coast line, the regular well formed pattern of waves would change to more confused and irregular types.

Swell waves with periods in the range of 16.7 to 18.2 seconds and a significant height of 2 to 2.6 metres began to appear on the wave records at the Torbay waverider buoy at 0430 to 0730 on the morning of October 15. By 0920 the significant height had grown to 4 metres and stayed in the range of 4 to 6 metres for the rest of the day. These waves were not generated locally but had propagated from an area to the north-east, probably some 500 to 800 nautical miles away. They were very energetic waves because of their length, and therefore prone to breaking and very dangerous in shallow water.

During the time of the casualty, the tide was also low, increasing the danger.

There are two other effects which could have increased the height and energy of the waves at the site. The waves could have been focussed either by bathymetry or by interaction with shears in any tidal currents that might have been present.

Current

It was noted that, as could be expected, the body floated around the bay in an anti-clockwise direction. The Labrador Current, at some 1 to 2 knots, sweeps past the mouth of Torbay in a southerly direction.

12. Time of Sunset

| | Sunrise | Sunset |
|---|---|---|
| Actual time | 0720 | 1813 |
| Civil Twilight | 0648 | 1844 |
| Nautical Twilight | 0613 | 1920 |

Twilight is that period of incomplete darkness following sunset and preceding sunrise. Evening twilight starts at sunset, and morning twilight ends at sunrise. The darker limit of twilight occurs when the centre of the sun is a stated number of degrees below the celestial horizon. The sun's zenith distance is 96° for civil, and 102° for nautical twilight.

The day was partly cloudy with good visibility and a full moon.

13. **History and Background of Rigid Inflatable Boats**

**History and Development:** The use of inflatable boats was initiated by the military during World War II, when many thousands of inflatable dinghies were made to equip fighter and bomber aircraft. A new industry was born at that time, with pleasure markets providing the later demand. Zodiac was associated from the beginning, starting in 1936 with Debroutell's boat. Dunlop developed the Gemini inflatable boat in 1955 for the use of the Royal Navy and Royal Marines and in 1959, Avon started making inflatable craft. In France, the lifeboat authorities started using inflatable boats powered by outboard motors in the late 1950's as a form of beach rescue craft.

The technology advanced over the years with the development of design and construction of small fast rigid-hull craft and the inflatable water-proof rubber fabric was used in dinghies during World War II and later adopted for yacht tenders. The combination of these designs created the need to develop engines having good power-to-weight ratios. The purpose of such a design was to provide a craft that was capable of high speed in adverse weather conditions, good manoeuvrability and safe handling characteristics, ample reserve buoyancy and built-in fendering to achieve the best possible combination for rescue purposes.

**Background:** In an effort to enhance Search and Rescue capabilities, especially after the loss of the drill rig "OCEAN RANGER", an evaluation of Search and Rescue capabilities recommended that more emphasis be placed on the use of smaller, fast craft and greater use of volunteers. As a result, in 1984, the Canadian Coast Guard carried out an extensive evaluation program on five different types of rigid hull inflatable (RHI) craft to be utilized in the following roles:

1) Ship-borne rescue boats on offshore SAR patrol

vessels.

2) Quick response inshore rescue boat, supplementing SAR vessels, operating from a station mode.

Following these evaluations, a statement of operational requirements and construction standards for rigid hull inflatable craft was drafted on May 1, 1984. Subsequently, through the tendering process, a contract was awarded to Zodiac Marine in 1985 to build and deliver 10 RHIBs (Zodiac Mark VII) for ship-borne operations. This new type of craft was not previously tested or evaluated by the Coast Guard because it was not available on the market. Several problems were encountered in the Newfoundland Region of the Coast Guard with the Zodiac Mark VII craft such as deck leakage, exhaust fire, launch/recovery system, service difficulties and the lack of Ship Safety certification. Some of those problems have been addressed and rectified. As this type of FRC is either shore based or does not form part of the life-saving equipment of a vessel, there is no requirement for the ZODIAC MARK VII craft to be certificated by Ship Safety under any regulation.

There are some eight different types of RHIB craft made by different manufacturers, presently operating in the Newfoundland Region. With such a variety, some difficulties have been encountered in general maintenance because of these differences and the absence of standardization.

On March 22, 1987, the Search and Rescue Branch of the Canadian Coast Guard, Newfoundland Region, based on the national SAR requirement, completed a regional statement of operational requirements and construction standards and subsequently two Wavebreaker GTA 600 rigid hull inflatable craft were purchased locally. In December 1987 the "SIR WILFRED GRENFELL" was equipped with the new craft. These craft were reviewed initially in 1984 and were rated a close second highest on the list and, for various practical and operational reasons, were purchased.

At the time of the casualty, one of these GTA 600 RHIBs, CG243, was undergoing a refit ashore. It had been temporarily replaced by CG237, an RHIB fitted with two outboard motors.

**List of Equipment on board the FRCs at time of incident**

| FRC 244 | | FRC 237 | |
|---|---|---|---|
| Dacron Rescue Frame | 1 | Dacron Rescue Frame | 1 |
| Sea Anchor | 1 | Sea Anchor | 1 |
| Paddles | 2 | Boat Hook | 1 |
| Lifting Pennants | 2 | Tool Kit | 1 |
| Compass | 1 | Repair Kit Collar | 1 |
| Radar Reflector | 1 | Gasoline Antifreeze | 4 |
| Fire Extinguisher | 1 | Buoyant Heaving Line | 1 |
| Buoyant Heaving Line | 1 | Manual Air Pump | 1 |
| Divers Knife | 1 | Searchlights | 2 |
| Boat Hook | 1 | Portable Fuel Tank | 1 |
| Tool Kit | 1 | Rescue Blanket | 4 |
| Anchor and Line | 1 | Divers Knife | 1 |
| First Aid Kit | 1 | Painters | 2 |
| Thermal Blankets | 5 | Tow Rope | 1 |
| Searchlights | 2 | Spare Propeller | 1 |
| Flashlights | 2 | Compass | 1 |
| Smoke Flares | 2 | Parachute Flares | 3 |
| Parachute Flares | 2 | Hand Held Flares | 4 |
| Hand Held Flares | 5 | Fire Extinguisher | 2 |
| Binoculars | 1 | First Aid Kit | 1 |
| VHF Multi Channel Radio | 1 | Loran C (Furuno) | 1 |
| VHF Portable Radio | 1 | VHF Multi Channel Radio (Raytheon) | 1 |
| Painters | 2 | VHF Portable Radio (always taken) | 1 |
| Heaving Lines, Towing Lines Nylon ½", Polyprop Jiggers | 2 | Extra Rope and Heaving Lines as Required | |

Currently there are about 100 boats of the GTA 600 design operating world wide, the majority of which are operating in the North Sea as MOB-BOATS. (Man Overboard Boats).

**Capsized Rescue Craft CG244**

The capsized rescue craft Type 'Wavebreaker GTA 600' was built at C. & W. Welding Ltd., Bay Bulls, Newfoundland, for Wavebreaker Ltd. and sold to the Canadian Coast Guard, Newfoundland Region by Marine Sales & Services Ltd. The craft was approved by the Department of Transport, Board of Steamship Inspection, as Boat-Rigid Inflatable - 15 persons, Type Bennex M.O.B. GTA600, Certificate No.A1B/85/1, dated February 4, 1985, to be in compliance with the requirements contained in Schedule XVIII of the Life Saving Equipment Regulations for an "approved boat". In January 1988, Ship Safety published a standard for the construction, inspection and testing of rescue boats in Canada. The GTA600 is

approved by the Norwegian Maritime Directorate and complies with the International Convention for the Safety of Life at Sea 1974, including 1983 amendments.

This type of craft is classified in Norway as MOB-BOATS and is utilized mainly in recovering persons from the water and general rescue work.

**Description of Hull**

The hull is constructed of marine grade aluminum with some foam filled compartments, thus making the boat unsinkable under flooded conditions. The hull is stiffened by longitudinal bulkheads, transverse floors and vertical frames. The side shell plating is stiffened by 11 vertical frames port and starboard, welded to a non-skid marine aluminum deck and gunwale pipe. The outside of the side shell is stiffened by 2 horizontal flat bars port and starboard, welded on its edge for attaching the flotation collar. The cockpit is made self-bailing through non-return valves in the transom. It has a double helmsman seat and one-point rigid lifting arrangement.

**Damage Found on Recovery:** The forward section of the inflatable collar was missing but the other sections had remained inflated. The hull was holed in two places where the lifting frame and coxswain's control cab were crushed. The shell plating sustained several indentations in various places because of the heavy pounding against the rocks.

**Propulsion:** The craft was equipped with a 'Mono Lever' throttle/pitch control located on the starboard side of the console which controlled the power of a Volvo 200 h.p. TAMD 41 diesel engine, driving a Castoldi Water Jet.

**Damage Found on Recovery:** The engine cover was missing, console crushed, steering wheel and mono lever were detached. The jet was found clutched in the 'full forward' position, with the jet rudders in a slight starboard turn. The jet water intake was fully open without foreign material closing the intake. It could not be determined what position the jet was in at the time of the capsizing because of the damaged throttle/pitch cable.

**Self-Righting System:** The craft was fitted with a self-righting inflatable gas bag, a manually activated CO2 system, attached to an aluminum tubular frame over the aft section. The system can be activated by pulling a

hand cable secured to the aft platform which releases the gas to inflate the bag. The self-righting unit on board the craft was inspected on June 7, 1989 and found satisfactory.

**Damage Found on Recovery:** After the capsizing and heavy pounding against the rocks, the self-righting frame including the inflatable bag were separated from the hull and only a small section of the frame was recovered. The inflatable bag was seen inflated during the casualty, however, it was not recovered.

The self-righting frame was secured to the boat's gunwale by a fillet weld. The weld was still attached to the gunwale after the separation of the tubular frame. The attachment of the frame to the boat is of minimal strength but the loss of the frame (and uprighting bag) is not considered to have played a part in the tragedy because as soon as the crew was in the surf, the boat, whether upright or capsized, would have been of little assistance to them.

**Rough Water Performance:** In spite of the numerous types of Rigid Hull Inflatable (RHIB) rescue boats in service by the Canadian Coast Guard, only one similar incident occurred in October, 1986, where a Zodiac boat flipped over in high seas during a rescue mission. A United States Coast Guard publication unofficially reported that nine RHIBs have capsized in rough weather and/or in heavy surf. Reportedly some of the factors leading to capsize were indentified as follows:

- in certain conditions where the flotation collar shoulder dips into the water or where they become more than 50% submerged, they may act as a tripping point and may cause the boat to capsize; and

- the aft location of the longitudinal centre of gravity and the distribution of the inherent buoyancy in the flotation collars may not allow the RHIB to break through a wave as is essential when transitting surf. Consequently, instead of breaking through the waves, the boat may rise up the face of the wave until it is overturned.

Some international research papers and publications explained that the most hazardous situation for a RHIB is whilst running before heavy, broken seas, and that if it is positioned near the crest of the wave, most likely it would fall down the face of the wave causing it to be pitch-poled by the sheer speed and weight of the following wave. As the craft accelerates down the face

of the crest with an extreme angle of descent, the bow will plunge into the denser water of the trough which will act as a braking mechanism. The force of water over the stern would roll the craft stern over bow. (see sketch).

Most high speed craft operating in rough water sustain motions and accelerations which vary nonlinearly with wave height. Three examples of the critical operational areas for inflatable craft operating in rough water are as follows:

(a) Running in following seas when bow down motions may be sufficient for hydrodynamic suction forces on the convex regions of the underside of the bow to cause the craft to "nose-dive" resulting in a marked deceleration, green water over the bow and possible 'pooping' by following waves.

(b) Running at high speed into strong head winds, when the aerodynamic moment, particularly when the craft is partially airborne at fairly high pitch angles, may be sufficient to cause undesirably large pitch angles and loss of control.

(c) In the hands of an experienced operator the speed and manoeuvreability of a RHIB may allow the most dangerous waves to be avoided in surf conditions. However RHIBs are not inherently surf capable, nor by design do they provide breaking wave protection to the crew.

**Maintenance and Inspection:** All maintenance, including the items recommended in the factory maintenance manual for the Wavebreaker GTA 600, was performed using a computerized maintenance management system. A special log book for rescue craft is also maintained aboard Search and Rescue ships, and contains details of all service performed and any irregularities. On board

as emergency boats during helicopter operations.

There are about 130 RHIBs in Canada of which about 70 are shore based SAR dedicated and some 60 are ship-borne craft.

## 14. Manning of FRCs

In the Newfoundland region, for safety reasons, it is generally the practice of Canadian Coast Guard SAR vessels carrying rescue craft to have three persons per craft, which includes a qualified deck officer in charge. Without a national Coast Guard policy in place it cannot be ascertained why it is a general practice that shipboard FRCs are manned by a fully-trained and qualified ship's officer in charge of the FRC during its operation, especially when it is the common practice for the CCG not to use qualified officers to operate shore based in-shore FRCs.

The crew manning CG244 at the time of the loss were well qualified, experienced and trained for the task at hand.

After the commissioning of the "SIR WILFRED GRENFELL" in 1987 the deck watches were maintained initially by qualified first and second officers. During April to October of 1988 and 1989, while the "SIR WILFRED GRENFELL" was engaged in the light station refueling program, a third officer was temporarily added to her complement by the Fleet Systems Directorate of the Canadian Coast Guard. The practice of assigning an extra deck officer for such duties was eliminated effective October 5, 1989 due to reduction of person years.

The two FRCs on the scene were manned by two deck officers. The bridge was manned by the master who was the On Scene Commander (OSC) and, with his two deck officers away in the FRCs, he was the only qualified navigating officer on board the "SIR WILFRED GRENFELL"; however, he was assisted by a cadet and a seaman and later by a marine SAR controller.

It is considered that had the crew of CG237 attempted a rescue of the crew of the capsized CG244, CG237 may have met a similar fate in that immediate vicinity.

## 15. Fatigue and Decision Making

The "SIR WILFRED GRENFELL" had been engaged in the following nine SAR cases from October 1 - 15, 1989:

| SAR Case No. | | Incident Time |
|---|---|---|
| Case 383 Oct. 1, | Disabled F/V | 2 hours |
| Case 389 Oct. 5, | Leonard J. Cowley Tow | 2 hours |
| Case 390 Oct. 6-9, | Disabled F/V | *52.3 hours |
| Case 391 Oct. 7-9, | Sick Crewman | *52.8 hours |
| Case 394a Oct. 9, | Disabled F/V | 2.8 hours |
| Case 395 Oct. 9, | Disabled F/V | 14.8 hours |
| Case 398 Oct. 12, | Open Boat Adrift | 2 hours |
| Case 399 Oct. 14, | Pilot boat disabled | 3.4 hours |
| Case 400 Oct. 15, | Investigation of Flare sighting | 2.4 hours |

*Cases occurred simultaneously

The chief officer's position is under the supervision of the commanding officer: he is responsible for directing and supervising the activities of the deck department; maintaining navigation and port security watches; assisting on the bridge and/or directing and supervising during berthing/unberthing and anchoring operations; ensuring that all administrative activities concerning the deck department are carried out; and performing related duties as directed by the commanding officer.

Prior to the casualty, Mr. Peddle worked some 33 hours of overtime between October 5-15, 1989, which included 12 hours of overtime on October 11 and 12 for RCMP daily exercises out of St. John's harbour; 4 hours for meal relief and the remaining 17 hours for SAR cases and general duties. His normal 12 hours of duty were from 0600 to 1200 and 1800 to 2400. He usually rested in the afternoon and his regular sleeping hours were after completing his watch at midnight until 0530. In his last working days Mr. Peddle claimed one hour of overtime daily. His position required some administration tasks for which, traditionally, overtime is not claimed. Shortly after the "SIR WILFRED GRENFELL" arrived in St. John's at 1215 on October 15, 1989, the chief officer spent some time in his bunk until he was called at about 1500.

The leading seaman, Mr. Welcher, had worked 9 hours overtime in the week preceding the SAR cases. The senior engineer, Mr. Gallien, had worked 7 hours overtime from October 5-15, 1989.

In summary, it may be concluded that fatigue was not a factor in this casualty.

## 16. Psychological pressure on rescue units

It is difficult to determine the extent to which the pressures generated by the considerable presence of the media and the public at Middle Cove affected the decision-making ability of the FRC crew in an attempt to recover the body.

Psychological pressure on individuals involved in rescue operations is well documented.

A study conducted by the Centre for Mental Health Studies of Emergencies of the U.S. Department of Health and Human Services found that an event such as a rescue operation generates a psychological and physiological response in a rescuer, resulting in strain which tends to exhaust an individual mentally and physically.

The study indicates that rescue workers are highly motivated to perform competently and to complete their mission successfully. This places physical, emotional and mental demands on such individuals. Additional stress is placed on rescuers in situations which attract an unusual amount of news media attention.

As audio and/or video recordings of rescue operations are subject to scrutiny by public officials and the general public, rescuers may feel that they may be unfairly portrayed as either failures or heroes. This situation can be further compounded by the presence of bystanders, especially in large numbers.

In this case, the presence of the media and a large number of the public at Middle Cove may have generated considerable pressure on the crew of FRC CG244, who were on site monitoring the situation for about 1¼ hours, to recover the body.

## 17. Communications

The following radio equipment was on board the primary SAR vessel, "SIR WILFRED GRENFELL" at the time of the incident:

- HF Radios 2 Motorola Micom X
- VHF FM Radio 2 Sailor RT 144 AC
- VHF AM Radio 2 Collins Comm. 251
- Mobile Telephone Glenayre GL 2021
- Satellite Communican Magnavox MX 2400
- Skanti WR 6000 Wate.. Receiver 2182 KHZ
- Kenwood R2000 Receiver
- Midland Model 7001 C.B. Radio

- Taiyo TD C338HS MF Direction Finder
- Oar 320E VHF Radio Direction Finder
- VHF Portable Radio Motorola HT 440 (4)

Prior to the arrival at 1830 of the Coast Guard Marine Emergency Unit at Middle Cove with a VHF radio, neither the "SIR WILFRED GRENFELL" nor the RNC had any means of direct communications (a common radio frequency) between them. However, all messages were handled through the RNC Communications Centre. It is not the practice for the police to carry VHF radios with marine frequencies in their vehicles; nor do SAR vessels in the Newfoundland Region carry radios with police frequencies.

It was revealed that only the RCMP helicopter has access to the RNC radio frequency, however it is possible to monitor the frequency without transmitting by using a tunable high frequency radio. Special permission has to be obtained from the Police Department to access their frequency.

The recovery of a person or a craft near a beach or shoreline in adverse conditions is a highly skilled operation where all FRC crew and those assisting ashore must be fully aware of their roles. The coxswain normally briefs his crew on the method of approach, and then he should inform those assisting ashore of his intentions. Those assisting ashore should inform the coxswain of the most suitable approach, free of obstructions.

In this case, FRC 244 was operating at sea level line of sight, without the benefit of information from those on shore with a vantage point from the 50 metre cliffs. A common radio frequency, with the Police and Fire Department rescue teams at the top of the cliff and the FRCs waiting to retrieve the body in the heavy surf conditions, would have been of considerable assistance.

To further enhance their radio communications capabilities, the Search and Rescue Branch of the Canadian Coast Guard, Newfoundland Region, will be installing, in the near future, several tunable VHF radios with police frequencies aboard all primary SAR vessels and at the Marine Rescue Sub Centre, St. John's.

## 18. Middle Cove

The last hydrographic survey carried out in the area of Middle Cove was in 1952 on a scale of 1:40,000 and Chart No.4846 -Motion Bay to Cape St. Francis, covers Middle

Cove at a scale of 1:60,000. Since Middle Cove is not a harbour and has no shelter for ships and small boats, no specific large-scale chart is available for that area which would assist mariners in determining the exact depth of water, including the various shoals near the rugged shoreline. Therefore, extreme caution must be exercised in operating any type of boat near the shore and especially during adverse sea conditions.

**19. Qualifications and Experience**

The chief mate, Mr. Peddle, was the holder of O.N.1 Certificate of Competency, issued in March, 1981. He joined the Canadian Coast Guard in February, 1982 as Marine Traffic Regulator, then joined Search and Rescue at a later date. In January 1988, he sailed on board the "SIR WILFRED GRENFELL" as chief mate and was a commanding officer aboard the "HOOD" from August 10 to November 2, 1988. He then rejoined the "SIR WILFRED GRENFELL" as chief mate on December 28, 1988 until the casualty occurred. His last medical examination was carried out on August 24, 1987. He had completed the following courses:

- Search Master Course
- CCG National Marine Search and Rescue Course
- M.E.D. II Certificate, expires on July 12, 1990
- Basic F.R.C. March 28 - 31, 1989
- Advanced F.R.C. September 18 - 21, 1989

The senior engineer, Mr. Gallien, was the holder of a Second Class Motor Certificate, issued in December, 1988 with a fourth class Steam Endorsement. After his graduation from the Coast Guard College, he joined the "SIR JOHN FRANKLIN" on June 7, 1982. He served on board various Coast Guard ships as an engineer until his appointment on board the "SIR WILFRED GRENFELL" on August 9, 1989. He had a MED II Certificate issued March 23, 1989, to expire March 22, 1992. His last medical examination was carried out in June 1988.

The leading seaman, Mr. Welcher, joined the Coast Guard on October 9, 1985 aboard the CCGS "BARTLETT", then served on board the CCGS "SIR HUMPHREY GILBERT", until he was appointed to the "SIR WILFRED GRENFELL" on April 22, 1987. He attended the Basic Fast Rescue Course on May 29 - June 1, 1989. His last medical examination was carried out in September, 1985.

The marine SAR controller at MRSC, St. John's, was the holder of a Coast Guard Command Certificate issued in June 1987. After his graduation from the Coast Guard

College in 1981, he served in various capacities as deck officer on board Coast Guard ships, including one year as chief officer on board the "SIR WILFRED GRENFELL". He joined Search and Rescue on December 12, 1988. He attended the National Search and Rescue Course in 1982 and Marine Emergency Duties Course (MED) in 1989. He also took a Sport Scuba Diver Course in 1980.

The senior diving instructor holds a Master's Degree in Biology, a Certificate as Master of Small Craft (40 tons), an annually renewable certificate which had expired in April 1989, and had obtained his Certification as Scuba Instructor from the National Association of Underwater Instructors in 1985; he had some 18 years international diving experience before that. He is a Royal Life-Saving Certified Life Guard and has been involved as an instructor in scuba related in-water rescue and emergency situations.

Mr. Caul's occupation was insulator. He started his scuba diving training at the beginning of August, 1989 and completed the Open Water Level I course, including 4 dives of the Open Water Level II Course. He was reported to be in good physical condition, a very good swimmer and familiar with body surfing and snorkling.

**Findings**

During an attempt to recover a floating body in the south-east corner of Middle Cove, Newfoundland on October 15, 1989, the Canadian Coast Guard fast rescue craft "CG244" capsized while operating in large confused breaking waves and heavy surf conditions close to the shoreline, resulting in the further loss of life of its three crew members.

**Body Surfers**

- the body-surfing exercise was not part of the regular course and was undertaken voluntarily; however, this acquired skill is considered desirable;

- the group elected to participate in instruction/practice in surfing, when some members were inexperienced, in conditions which should have been known to be very dangerous;

- the senior diving instructor was experienced in body-surfing and offered assistance during the rescue efforts, going out into the cove twice in deteriorating surf conditions, returning safely, although with some difficulty;

- Mr. Caul, after having become separated from the training group, probably died from drowning following physical injury/exhaustion caused by battering on the rocks;

- Mr. Caul's wet suit had inherent buoyancy, even in a torn condition, but its colour did not assist later detection; and

- the senior scuba diver instructor was well qualified and experienced.

**Fast Rescue Craft CG244**

- is a most suitable craft for inshore rescue work;

- as with all craft, has some operational limitations, particularly when running before large breaking waves and when operating in surf;

- was overwhelmed by a sudden breaking wave while in a 'stern-to' attitude, flooding the forward part of the craft and causing a 'pitch-pole' capsizing;

- capsize was made inevitable in the very shallow water by the bow striking the bottom as the wave lifted the stern; and

- following the capsize, the manually operated self-righting inflation bag was seen to be inflated but separated from the craft.

**Fast Rescue Craft Crew**

- being the only crew on scene capable of recovering the body, may have been under considerable psychological pressure as their operations were being watched from the shore by a large number of the public, media and police;

- knew that helicopter support could not be expected and this knowledge placed additional pressure on them to effect a recovery;

- in the failing light conditions and during an observed lull in the sea conditions in the vicinity of the body, elected to attempt recovery from the shallow, rocky water rather than wait for the body to drift well clear;

- two of whom wore modified Fitzwright SAR suits with manually activated inflatable vests, but neither suits nor vests had inherent buoyancy if torn and, thus, would not give positive buoyancy to the victims;

- did not wear Coast Guard approved marine industry lifejackets, which have the capability of turning an unconscious body face upward, because they are considered cumbersome and, thus, dangerous while working in a small craft;

- one member of whom died as a result of drowning in the heavy surf preceded by physical injuries sustained due to being battered on the rocks and the other two crew members probably shared the same fate; and

- was well qualified, trained, and experienced for the task.

Search and Rescue

- MRSC did not recommend to RCC the tasking of a helicopter at the outset, although such a requirement was suggested by the RNC.

- made the decision that a helicopter was not required and CG237, on site, confirmed that a helicopter would not be effective in that situation;

- knew that the closest helicopter with a suitable hoist capability would have taken some two hours to arrive at the cove; and

- vessels at sea were unable to communicate directly with the RNC on shore.

Other Findings

Technically, the RNC were in control of the body recovery and the SAR components were in a supporting role.

With both navigating officers from the "SIR WILFRED GRENFELL" operating the two FRC's in Middle Cove, the master was the only qualified deck officer left aboard in order to cope with all the navigational, communication, SAR requirements and other contingencies.

Although there are regional requirements, there is no national standard in place for the training and manning of Coast Guard personnel in the use of fast rescue craft.

Ship borne FRCs are being used for expanded operational roles in Coast Guard but still rely on a mother ship for effective navigation and safety monitoring.

The many different types of FRCs operated by the Coast Guard impose some operational and maintenance difficulties.

The type and operational needs for helmets and safety belts to be worn by CG FRC crews are issues which have not been resolved.

Marine Casualty Investigations
Transport Canada
110 O'Connor Street
Ottawa, Ontario
K1A 0N5

JULY 1990

FLOTATION COLLAR FOR USE WITH FITZWRIGHT SAR SUIT

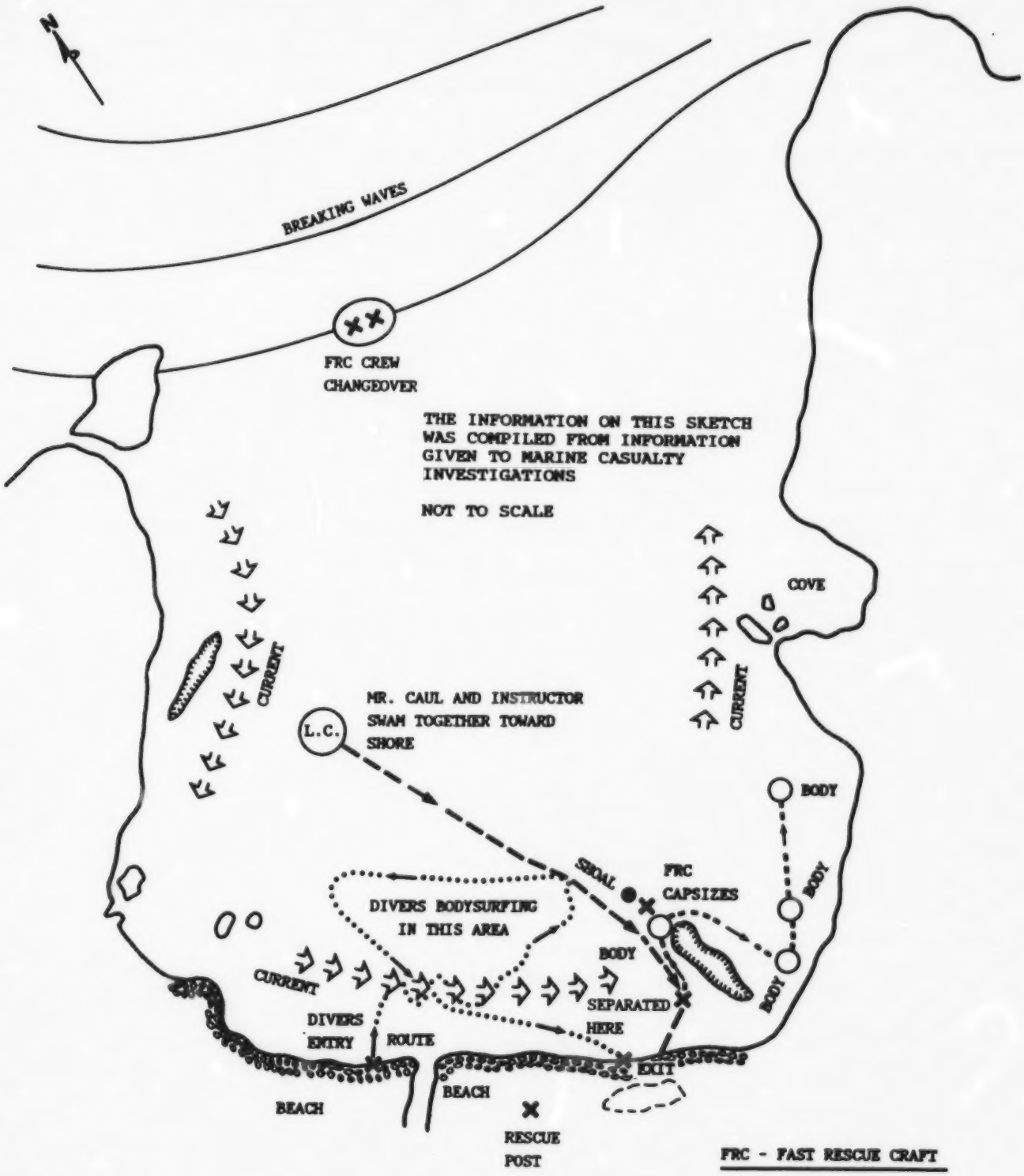
COLLIER DE FLOTTAISON UTILISÉ PAR SAR EN PLUS DE LA COMBINAISON FITZWRIGHT



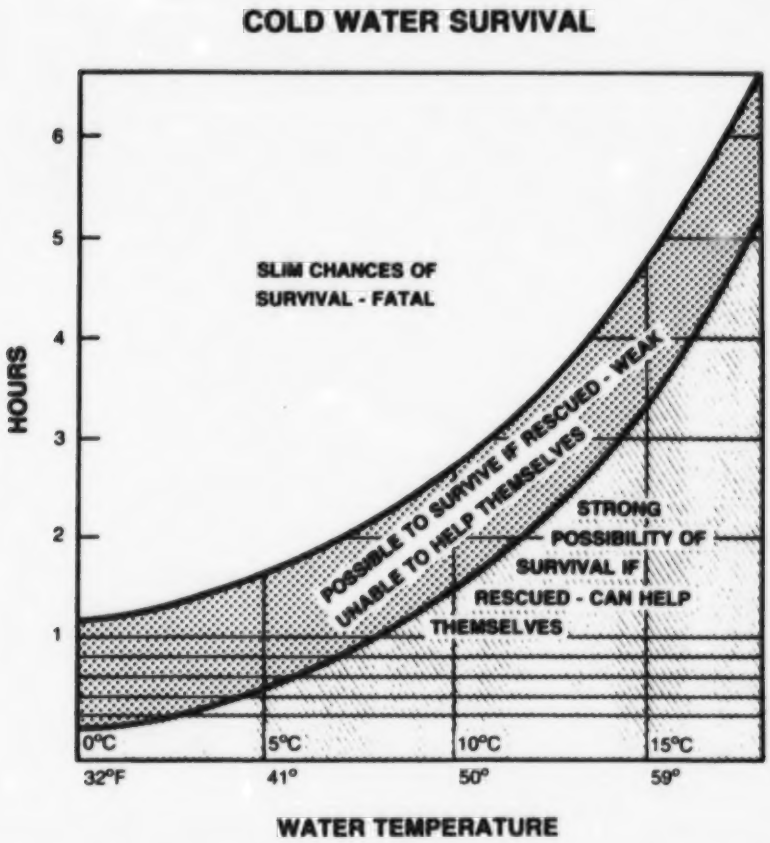

MODIFIED FITZWRIGHT SAR SUIT

COMBINAISON MODIFIÉE DE MARQUE FITZWRIGHT DONT SE SERT SAR

MIDDLE COVE BEACH



ANNEX I




The accompanying graph shows average predicted survival times of average, adult humans in water of different temperatures. The figures are based on experimental cooling of average men and women who were holding still in ocean water and wearing a standard lifejacket and light clothing. The graph shows, for example, that predicted survival time is about 2½-3 hours in water of 10°C (50°F). Predicted survival time is increased by extra body fat and decreased by small body size. Although women generally possess slightly more fat than men they cool slightly faster due to their usually small body size. However, for comparable sizes, the man will cool faster.

"COLD WATER SURVIVAL"
CANADIAN RED CROSS

## ANNEX II

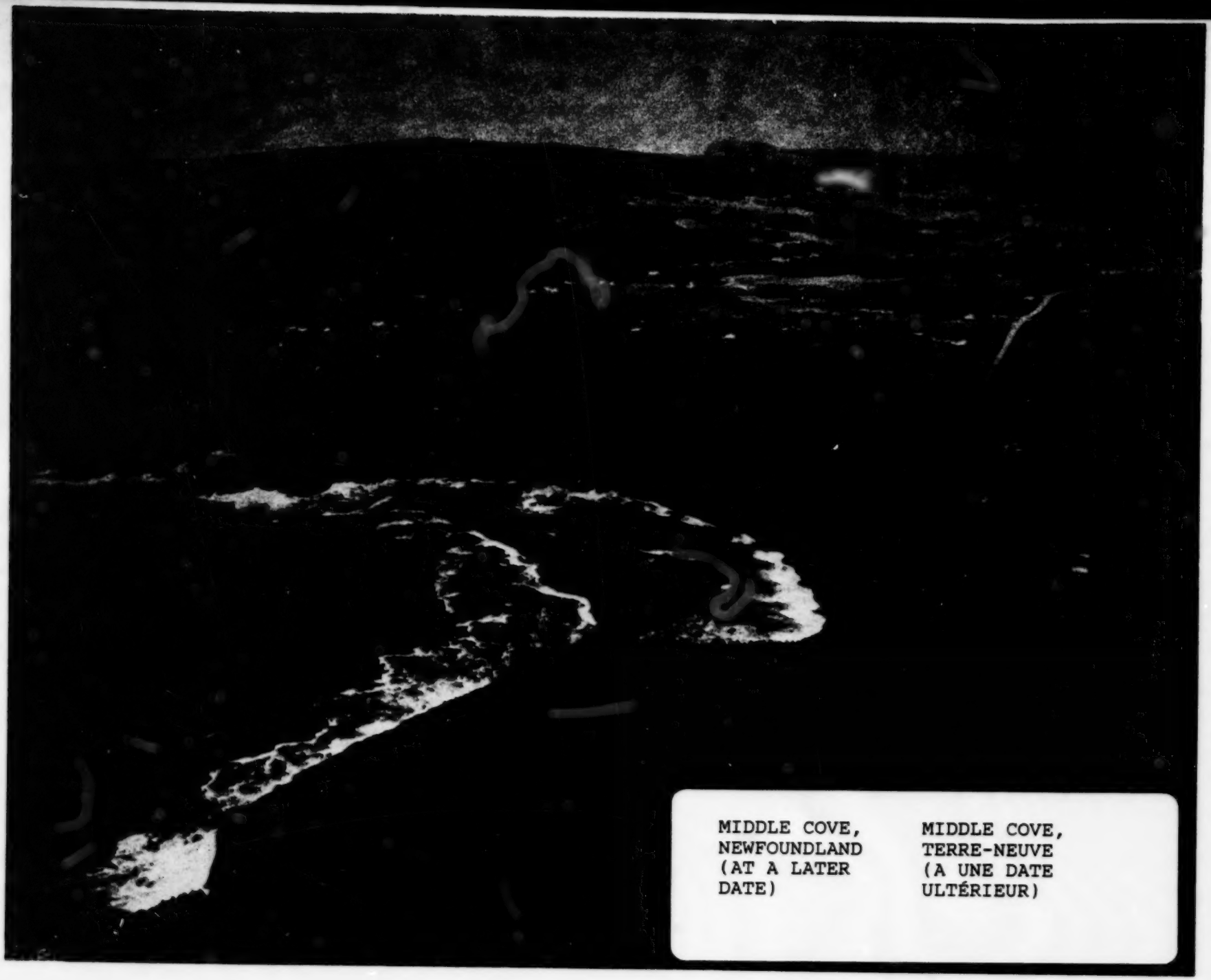
## LEVELS OF HYPOTHERMIA (1)

| °F | °C | |
|---|---|---|
| 99.6 | 37.6 | 'Normal' Rectal Temperature |
| 96.8 | 36.0 | Increased Metabolic Rate in attempt to balance heat loss |
| 95.0 | 35.0 | Shivering maximum at this temperature |
| 93.2 | 34.0 | Patients usually responsive with normal blood pressure |
| 91.4 | 33.0 | SEVERE HYPOTHERMIA BELOW THIS TEMPERATURE |
| 89.6 | 32.0 | Consciousness clouded. Pupils dilated most shivering ceases |
| 87.8 | 31.0 | Blood Pressure difficult to obtain. Pupils dilated most shivering ceases. |
| 86.0 | 30.0 | Progressive loss of consciousness, increased muscular rigidity |
| 85.2 | 29.0 | Slow pulse and respiration |
| 82.4 | 28.0 | Cardiac arrhytmia develops. Ventricular fibrillation may develop if heart irritated |
| 80.6 | 27.0 | Voluntary motion lost along with pupillary light reflex; deep tendon and skin reflexes appear dead |
| 78.8 | 26.0 | Victims seldom conscious |
| 77.0 | 25.0 | Ventricular fibrillation may appear spontaneously |
| 75.2 | 24.0 | Pulmonary Edema develops |
| 73.4 | 23.0 | |
| 71.6 | 22.0 | Maximum risk of fibrillation |
| 69.8 | 21.0 | |
| 68.0 | 20.0 | Heart Standstill |
| 66.2 | 19.0 | |
| 64.4 | 18.0 | Lowest Accidental Hypothermic patient with recovery |
| 62.6 | 17.0 | ISO-ELECTRIC EEG |
| 48.2 | 09.0 | Lowest Artificially Cooled Hypothermic patient with recovery |

---

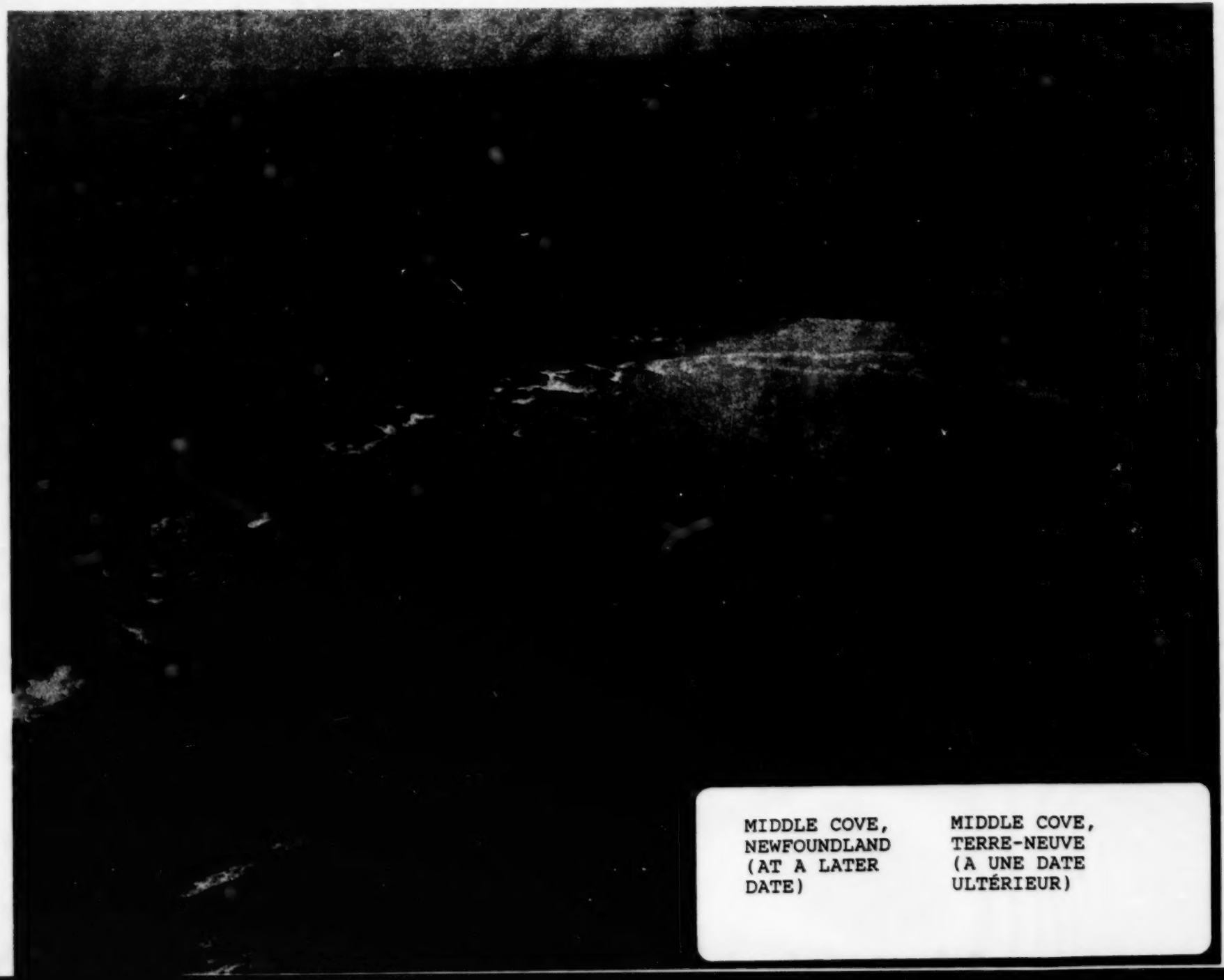
(1) Table prepared by Harnett, et al (1979)

"SIR WILFRED GRENFELL"
Canada



MIDDLE COVE, NEWFOUNDLAND (AT A LATER DATE)

MIDDLE COVE, TERRE-NEUVE (A UNE DATE ULTÉRIEUR)

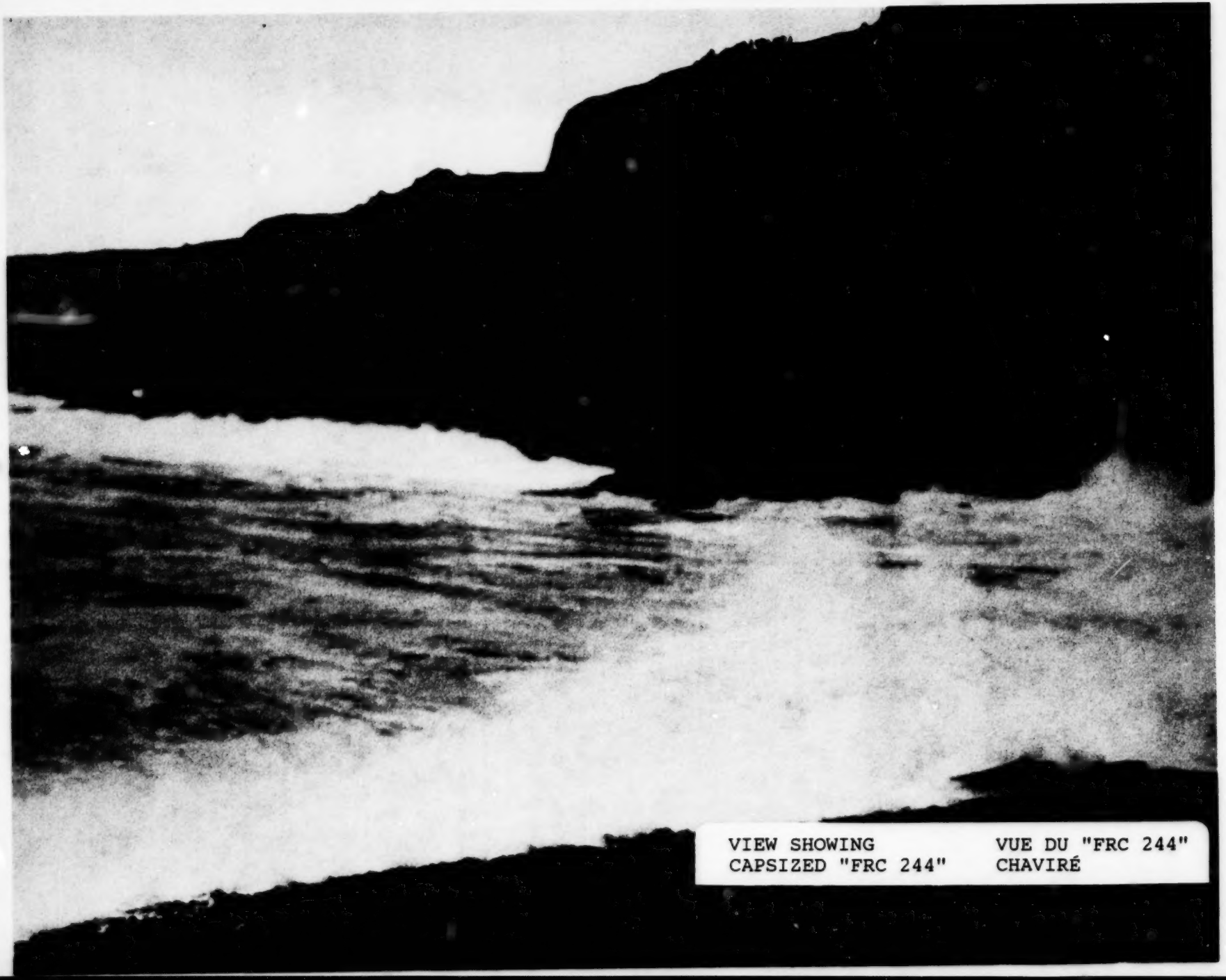


MIDDLE COVE,
NEWFOUNDLAND
(AT A LATER
DATE)

MIDDLE COVE,
TERRE-NEUVE
(A UNE DATE
ULTÉRIEUR)

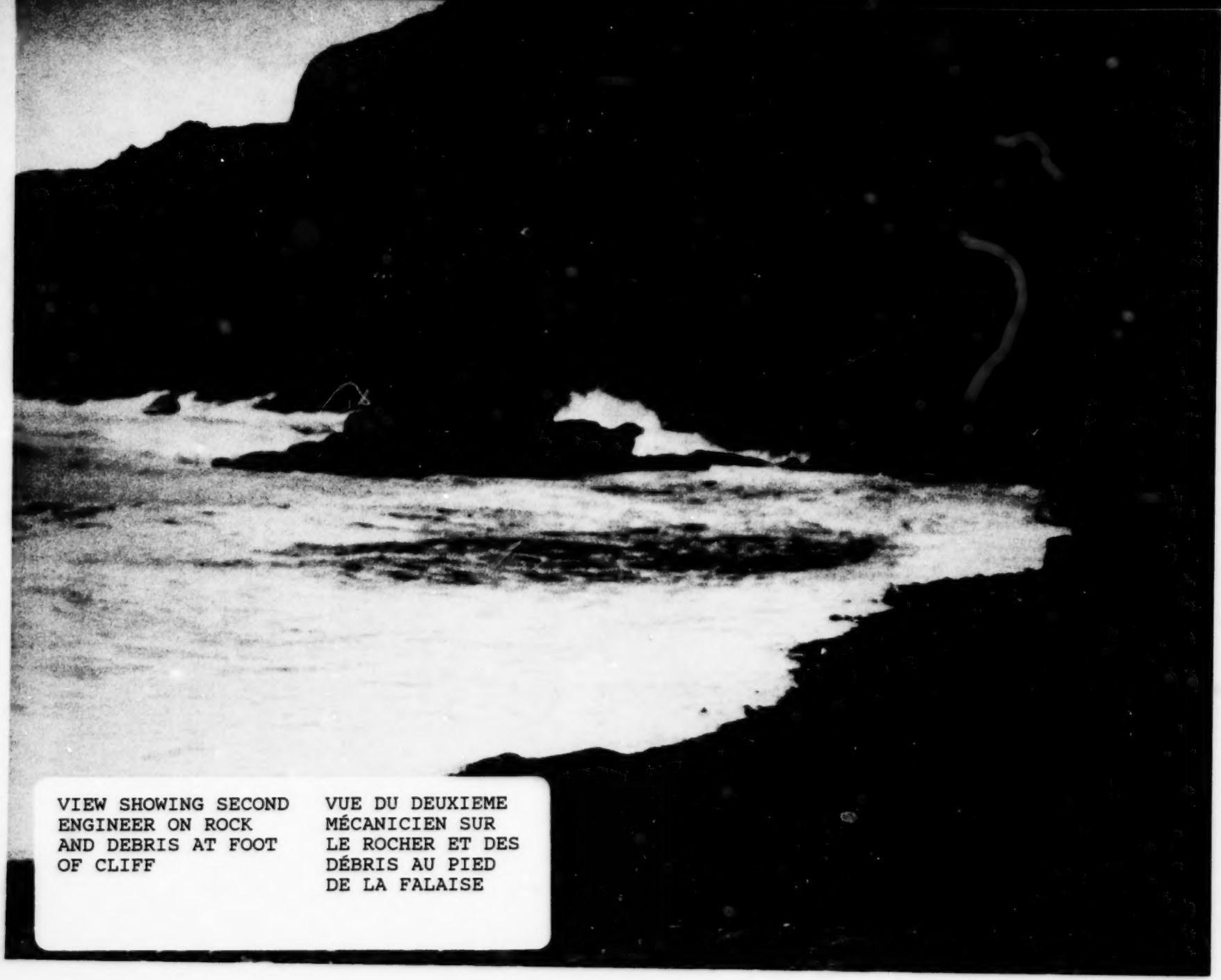
MIDDLE COVE BEACH
PRIOR TO CAPSIZE
OF "FRC 244"

PLAGE DE MIDDLE
COVE AVANT LE
CHAVIREMENT DU
"FRC 244"



VIEW SHOWING CAPSIZED "FRC 244"

VUE DU "FRC 244" CHAVIRÉ



VIEW SHOWING SECOND ENGINEER ON ROCK AND DEBRIS AT FOOT OF CLIFF

VUE DU DEUXIEME MÉCANICIEN SUR LE ROCHER ET DES DÉBRIS AU PIED DE LA FALAISE

VIEWS OF SISTER VESSEL OF "FRC 244"

EMBARCATION SEMBLABLE AU "FRC 244"

VIEW OF SISTER VESSEL OF "FRC 244" (NOTE AIR BAG ON FRAME)

EMBARCATION SEMBLABLE AU "FRC 244" (REMARQUEZ LE SAC PNEUMATIQUE SUR L'ARMATURE)

VIEW OF SISTER VESSEL OF "FRC 244" (NOTE $CO_2$ CYLINDER ON FRAME AT TOP WITH CABLE DOWN TO STERN)

EMBARCATION SEMBLABLE AU "FRC 244" (REMARQUEZ LA BOUTEILLE DE $CO_2$ A LA PARTIE SUPERIEURE DE L'ARMATURE ET MUNIE D'UN CABLE QUI REJOINT L'ARRIERE)

CONTROL SIMILAR TO "FRC 244"

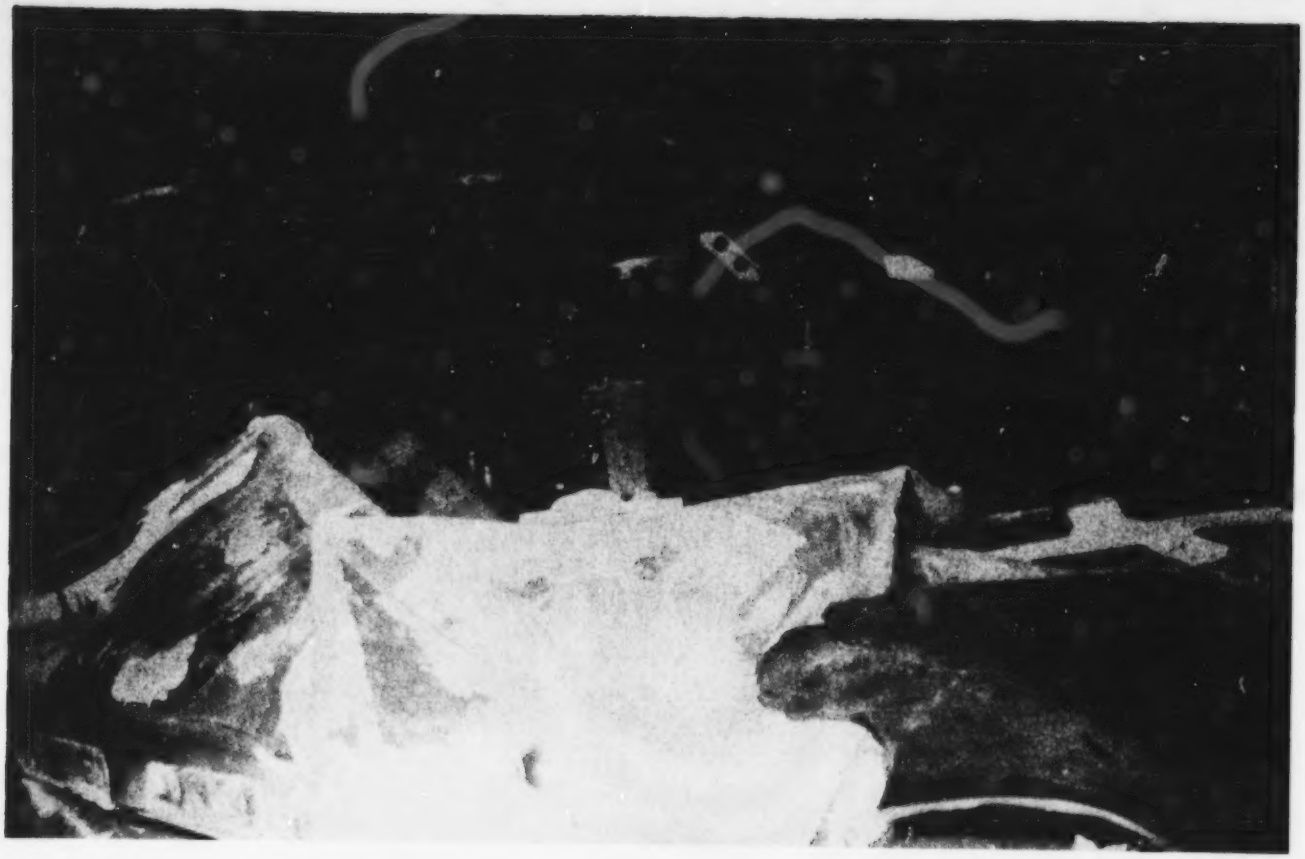
CONSOLE SEMBLABLE A CELLE DU "FRC 244"

MUSTANG FLOATER SUIT

COMBINAISON DE FLOTTAISON MUSTANG

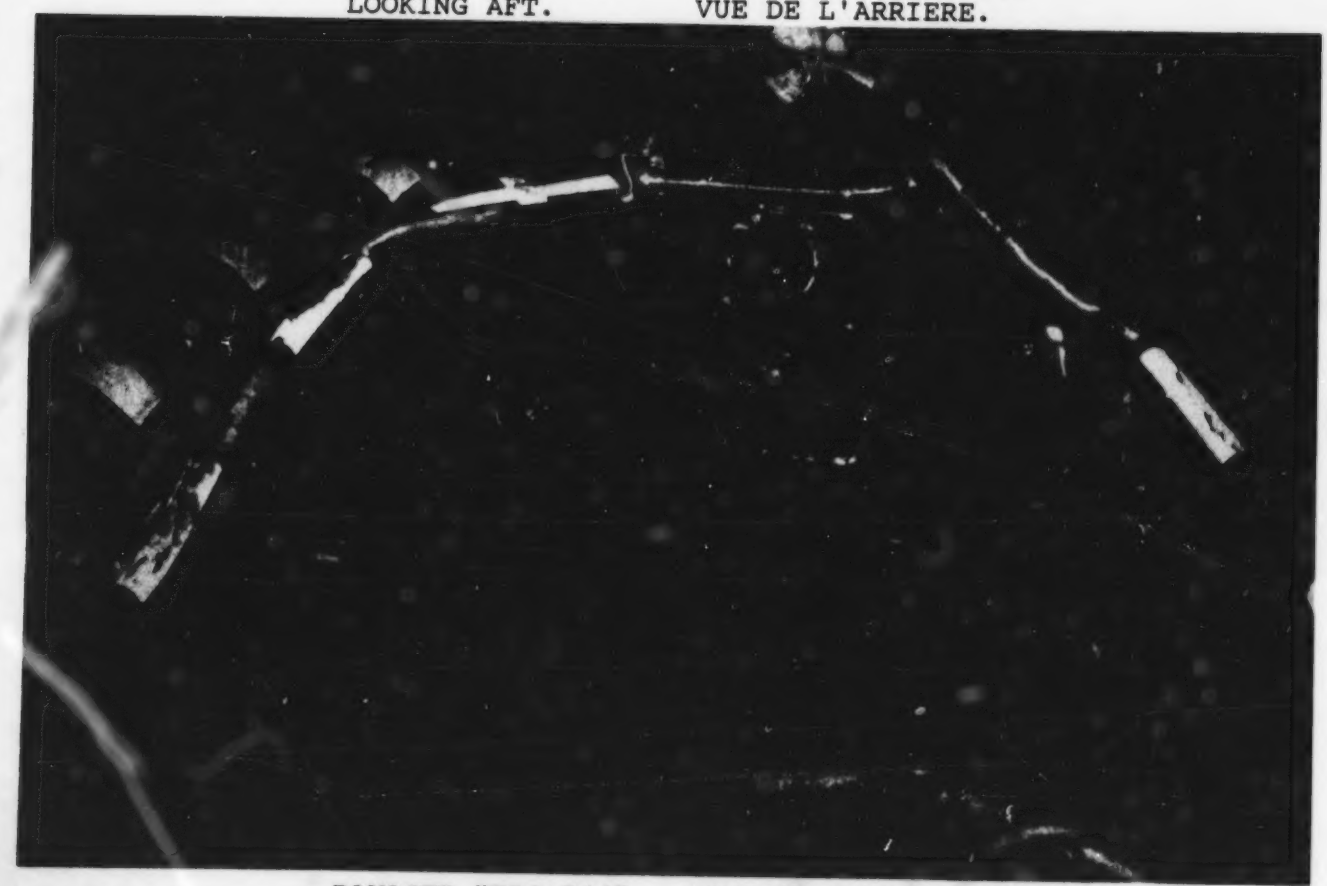
HELLY HANSEN SUIT

COMBINAISON HELLY HANSEN



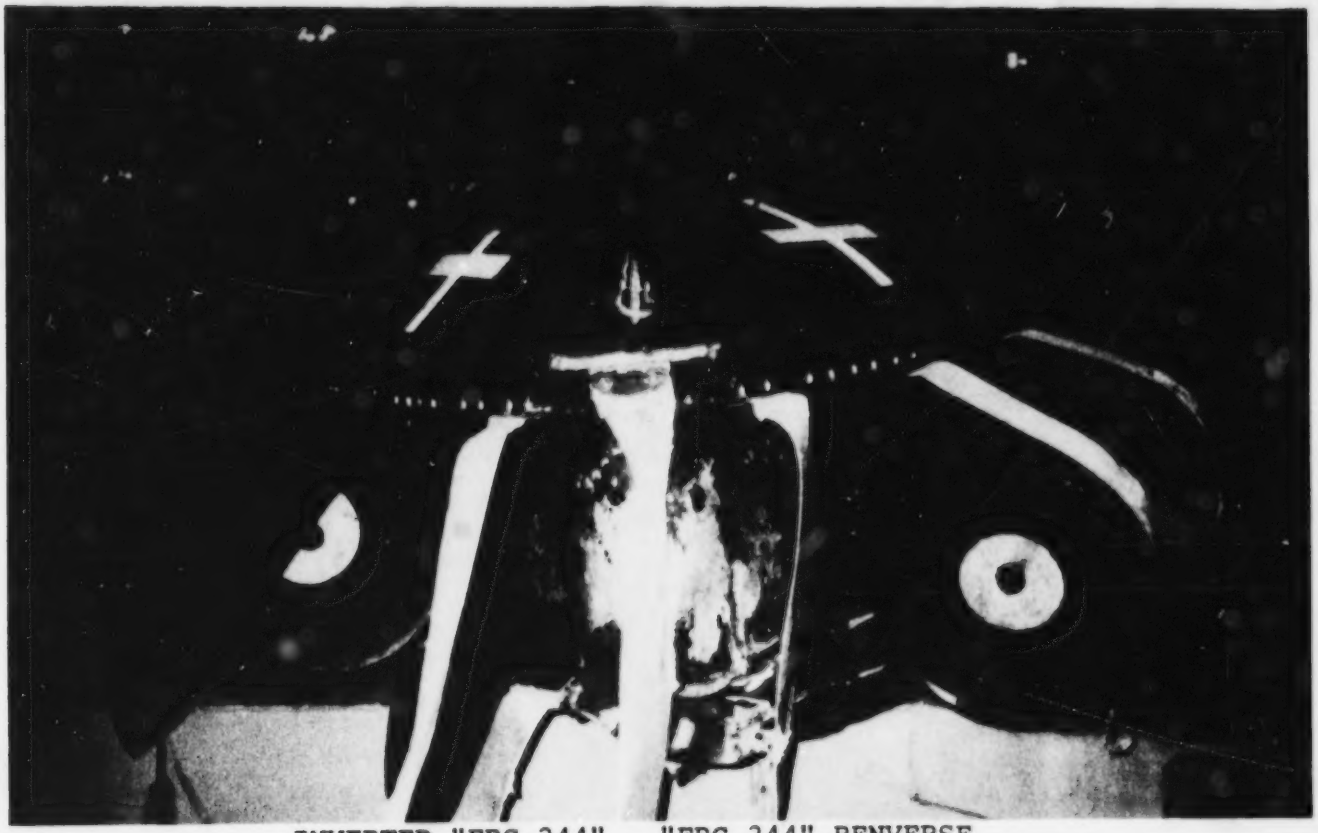
DAMAGED "FRC 244" LOOKING AFT.

AVARIES DU "FRC 244" VUE DE L'ARRIERE.



DAMAGED "FRC 244" LOOKING FORWARD.

AVARIES DU "FRC 244" VUE DE L'AVANT.



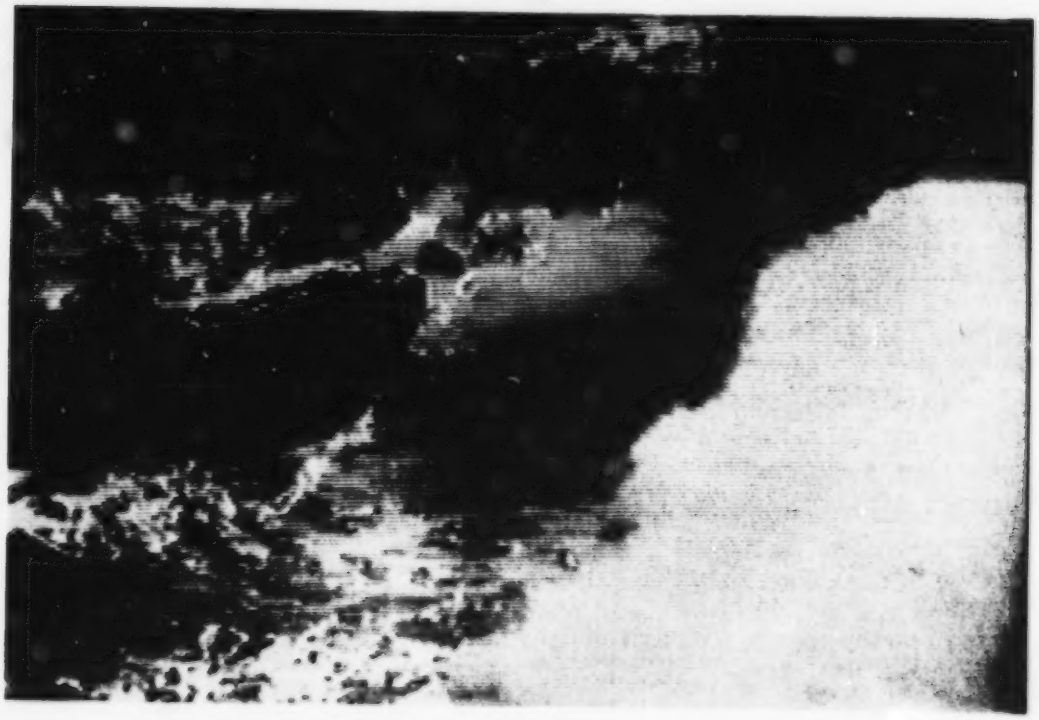
INVERTED "FRC 244" AFTER RECOVERY SHOWING BOW DAMAGE.

"FRC 244" RENVERSE APRES AVOIR ÉTÉ REPECHÉ MONTRANT LES AVARIES A L'AVANT.

**Sequence of events: Still photos taken from video**
**Chronologie des évènements: images fixes provenant de l'enregistrement vidéo**

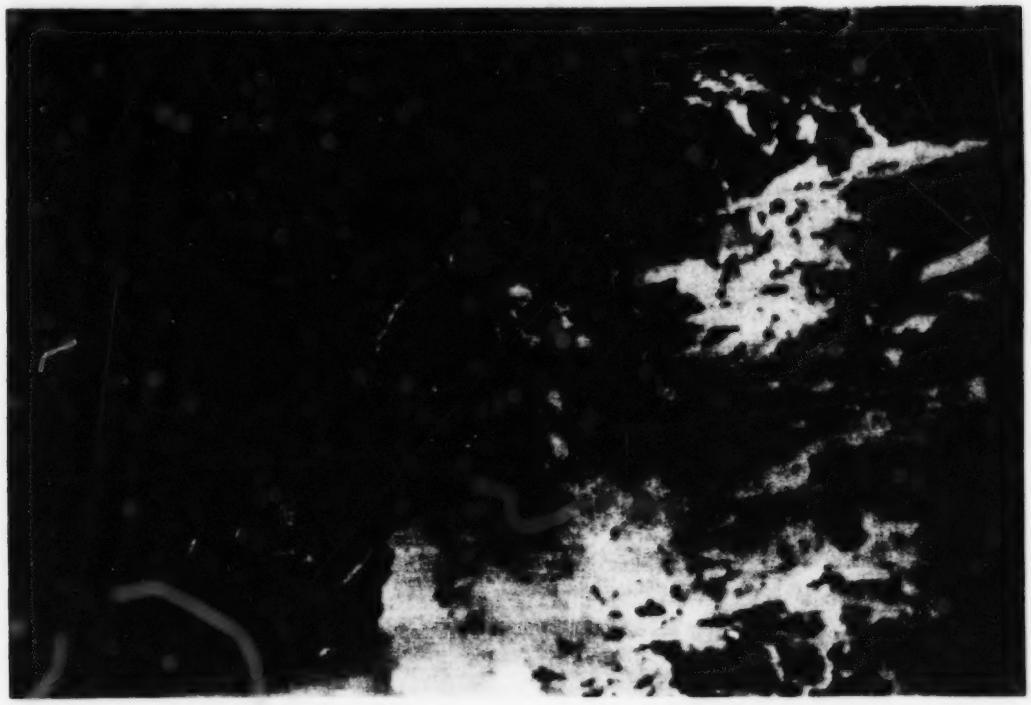
"FRC 244"APPROACHING BODY IN WATER TO STARBOARD

LE "FRC 244" S'APPROCHE DU CORPS PAR TRIBORD



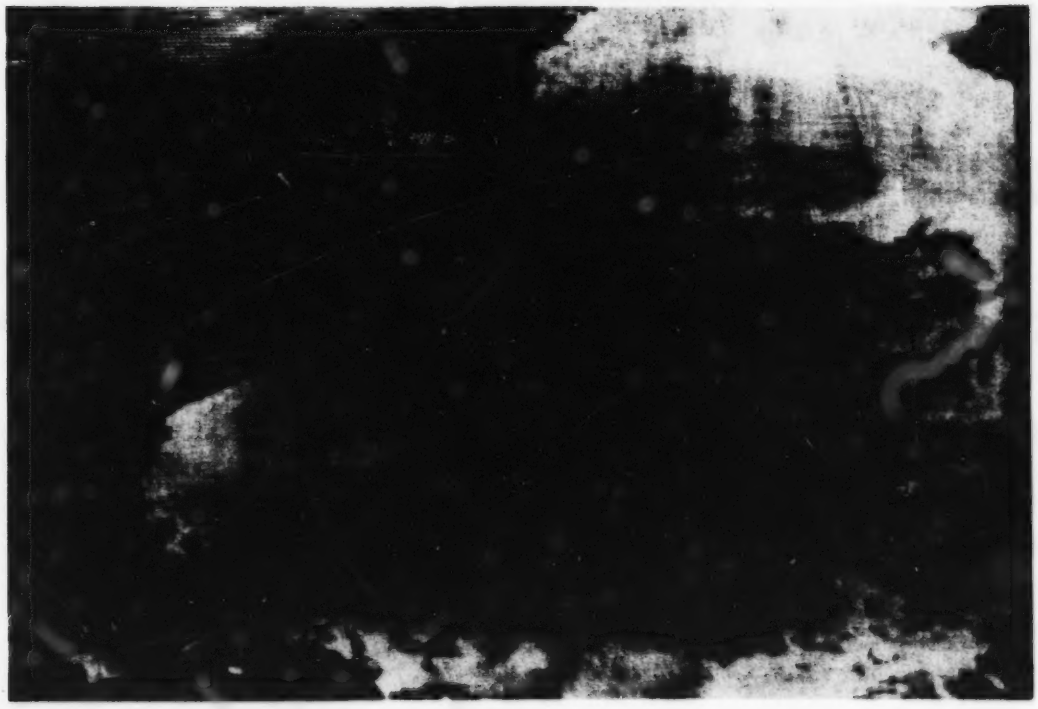
BODY BEING PULLED INBOARD

LE CORPS EST HISSÉ A BORD



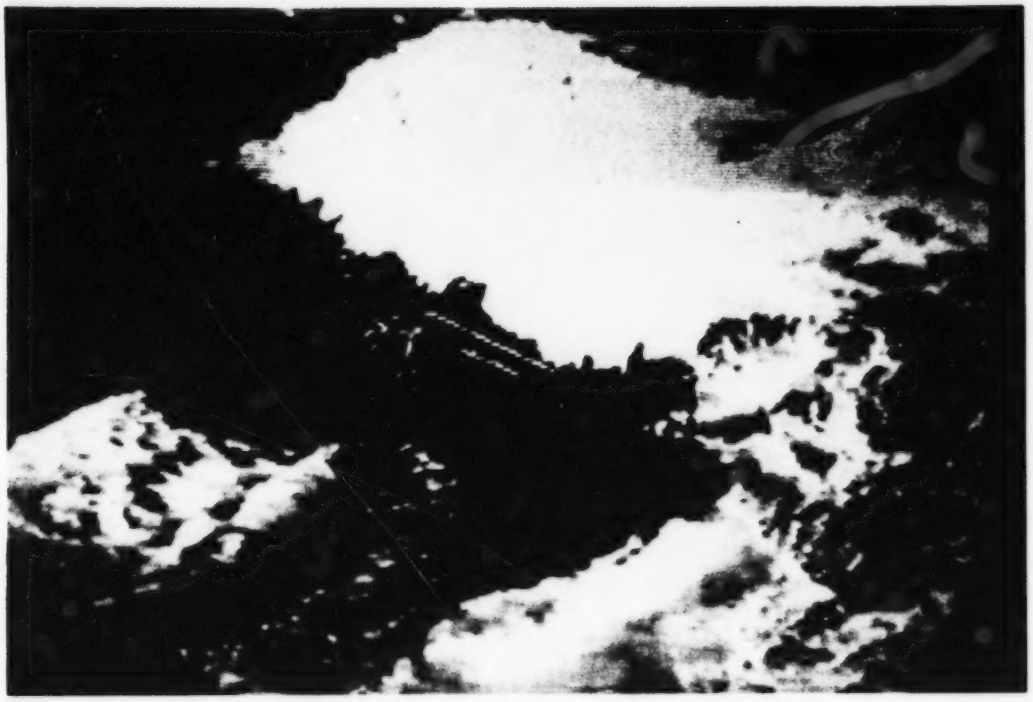
BODY STILL BEING PULLED INBOARD. WAVE SEEN APPROACHING FROM STBD. POWER APPLIED.

LE CORPS EST TOUJOURS HISSÉ A BORD. UNE LAME S'APPROCHE DU COTÉ TRIBORD. ON ENGAGE LA MACHINE



PORT WHEEL APPLIED; WAVE BREAKING OVER SHOAL ON STBD BOW.

ON MET LA BARRE A GAUCHE; UNE LAME DÉFERLE SUR LE HAUT-FOND PAR TRIBORD AVANT.



STILL HARD A PORT, FULL AHEAD; WAVE APPROACHING, CREW STILL RECOVERING BODY.

LA BARRE DEMEURE A GAUCHE TOUTE, LE MOTEUR EST A PUISSANCE MAXIMALE; UNE LAME S'APPROCHE ET LES MEMBRES D'ÉQUIPAGE RÉCUPERENT TOUJOURS LE CORPS.

WAVE STARTS TO FLOOD BOW, STERN LIFTING ON OVERTAKING WAVE.

SOUS UNE VAGUE DÉFERLANTE, L'AVANT S'ENFORCE ET L'ARRIERE SE SOULEVE.

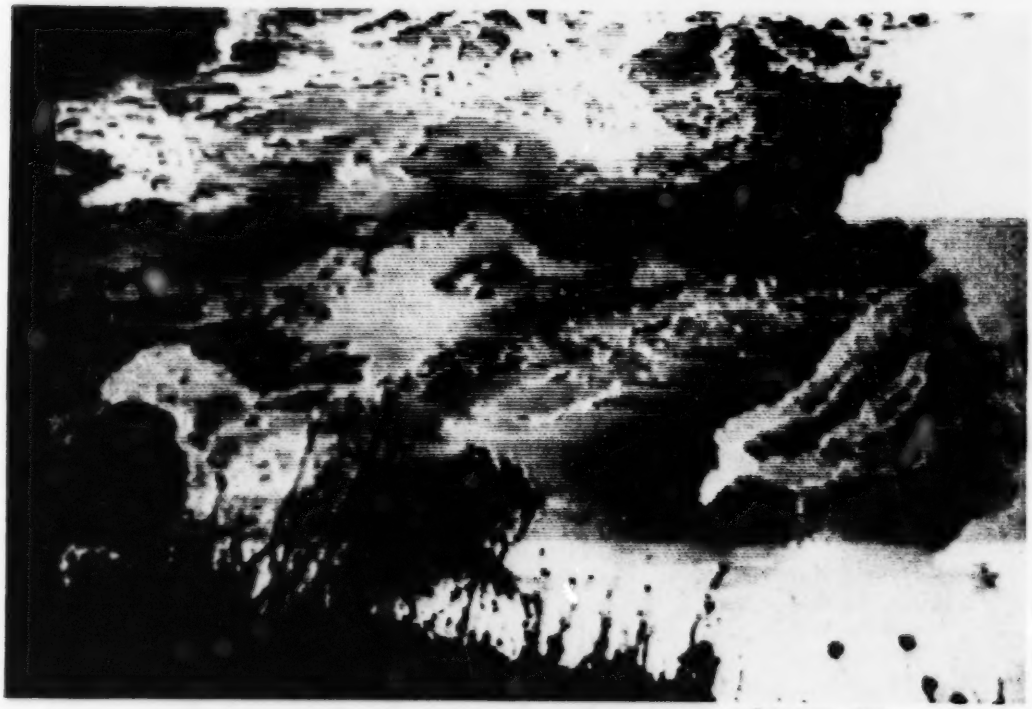
BOW IS FORCED DOWN, STERN UP, ON BREAKING WAVE.

SOUS UNE VAGUE DÉFERLANTE, L'AVANT S'ENFORCE ET L'ARRIERE SE SOULEVE.

"FRC 244" PITCH-POLES STERN OVER BOW.

"FRC 244" A ENFOURNÉ, ET A SANCI.

"FRC 244" CAPSIZED. "FRC 244" CHAVIRÉ.



"FRC 244" DRIFTING TOWARDS ROCK.

"FRC 244" DÉRIVE EN DIRECTION DU ROCHER.